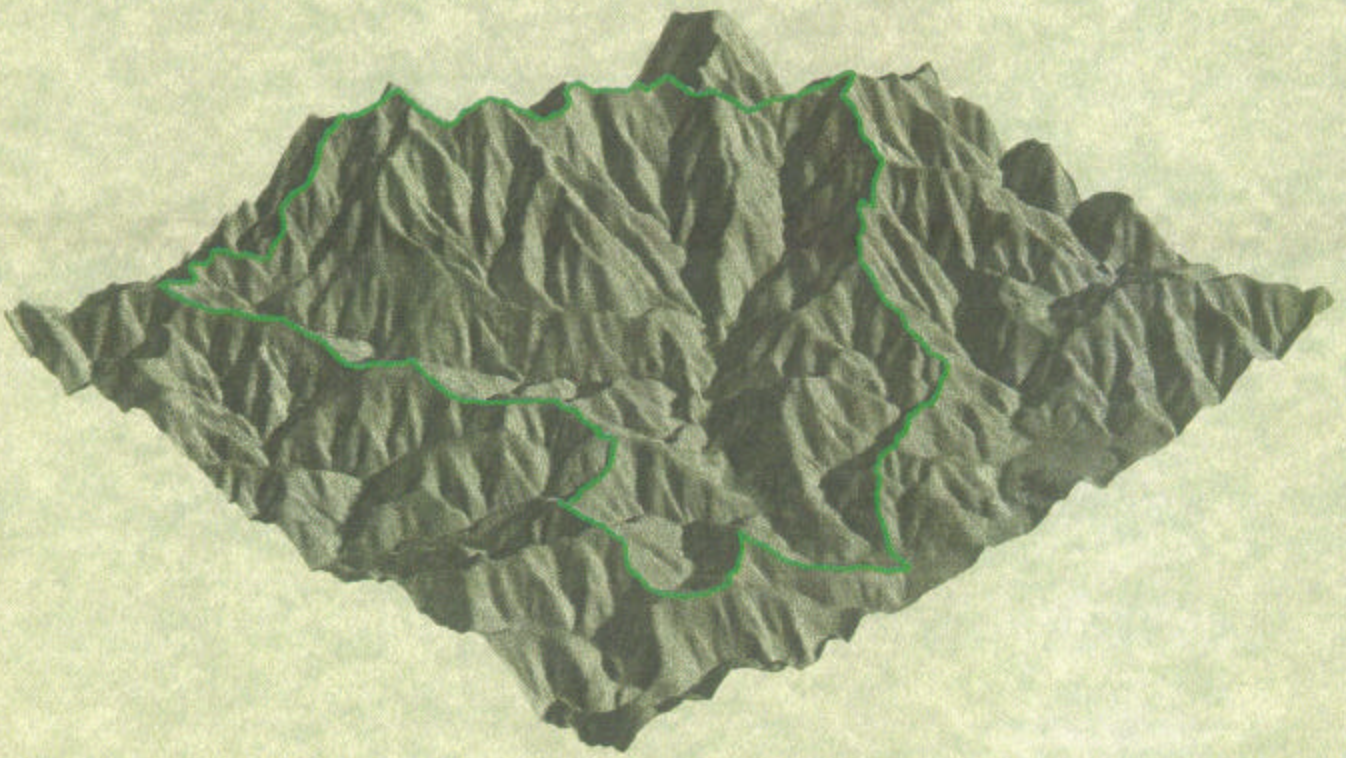
HONEYDEW CREEK WATERSHED ANALYSIS



U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Honeydew Creek Watershed Analysis

A report on the fourth largest tributary to the Mattole River

Bureau of Land Management
Arcata Resource Area

November 1996

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BLM/CA/PT-97/004+7210

Table of Contents

Appendices

List of Maps

List Of Figures

List of Tables

Chapter One
CHARACTERIZATION OF THE WATERSHED

PHYSICAL

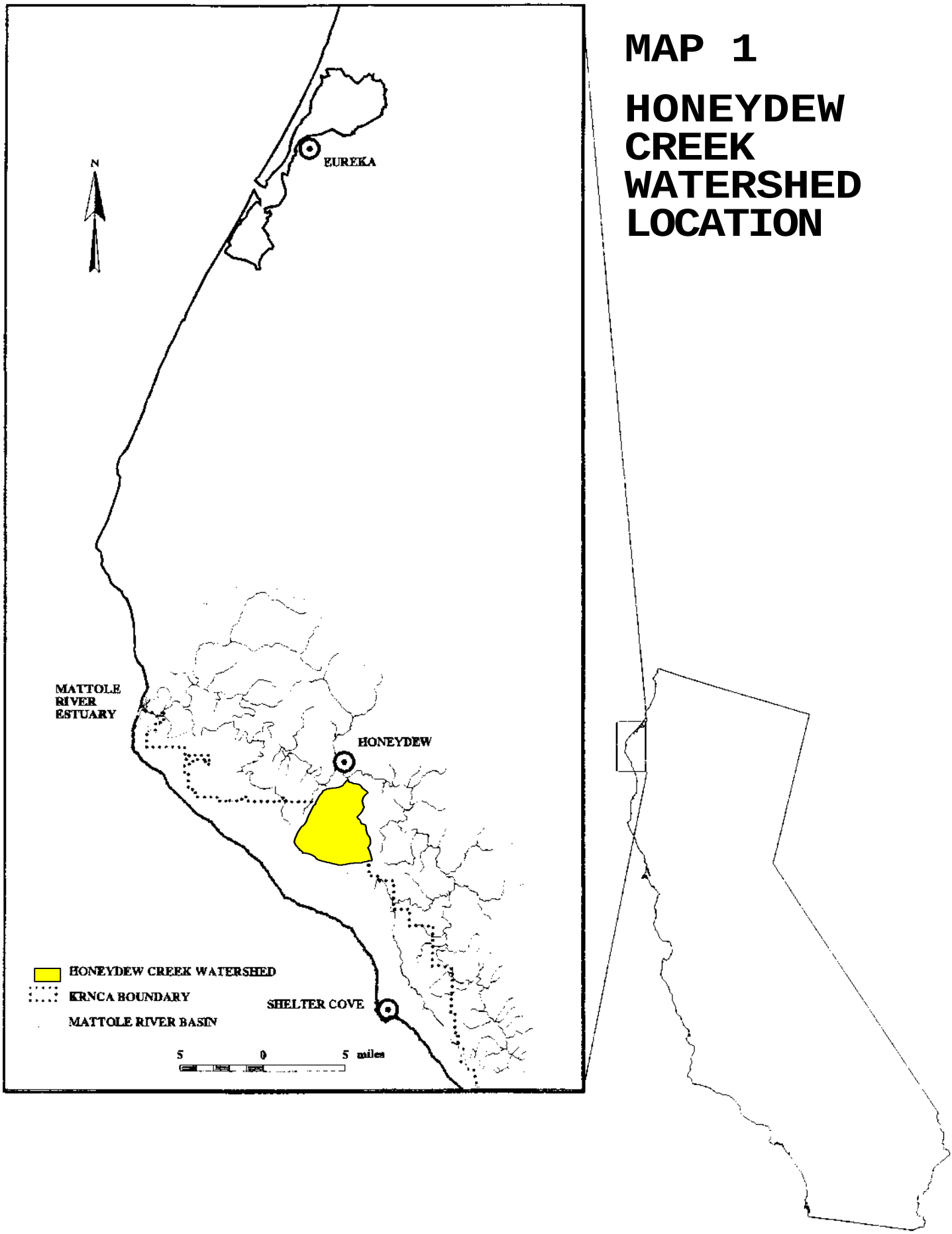
The Honeydew Creek watershed lies in southwestern Humboldt county in the California Coast physiographic province of northern California (Thomas 1993). Honeydew Creek public lands are within the boundaries of the King Range National Conservation Area. The headwaters drain north and east slopes of the King Range with the watershed boundary along the crest of the King Range approximately three miles from the ocean. It is the fourth largest tributary of the Mattole River with its confluence 3/4 mile southeast of the village of Honeydew eight miles inland from the coast. The Northwest Forest Plan identifies the watershed as a portion of the King Range Late Successional Reserve and as a Tier-1 Key Watershed in its entirety (USDA, USDI 1994). The watershed contains 11,001 acres of which 7,670 acres (70%) are public land managed by the Bureau of Land Management, Arcata Resource Area.

The Honeydew Creek landform is typical of much of the King Range and its environs. It is an extremely steep and dissected topography. Elevations range from a high of 4,087 feet on King Peak at the head of the Upper East Fork, to 340 feet at the confluence with the Mattole. The drop occurs over a distance of just over 5 miles, a straight-line gradient of nearly 15%. This steepness is reflected in the stream morphology. Stream channels are typically V-shaped and gradients in the smaller channels typically exceed 15%. The lower three and one-half miles of the mainstem and a short reach at the confluence of the East Fork are the only channels with gradients of less than 3%. High-gradient tributaries transport sediments which are deposited and stored in the lower mainstem. The watershed exhibits a high stream density, the seventeen square mile area containing 193.9 miles of perennial, intermittent, and ephemeral stream channel averaging 11.4 miles of stream for each square mile of the landscape.

The dramatic topography is a product of intense seismic activity and has some of the highest uplift rates in California rising as much as ten feet per thousand years at Cape Mendocino. The collision of three tectonic plates offshore from Cape Mendocino and the myriad of subsidiary faults results in frequent earthquakes reported at the rate of one to three per day. Numerous earthquakes of magnitude four or greater occur each year with damaging earthquakes on the average of every three years (Dengler et al. 1992). The continuously growing mountain chain of the King Range tends to over-steepen slopes. The uplifted mountains are a collection of marine sediments consisting of serpentine mixed with volcanic material (MRC 1989). As they are uplifted, these sediments are folded and mixed creating a parent material which is incompetent, breaking down easily and being highly subject to erosive forces. Mass wasting and chronic surface erosion, particularly on disturbed sites, is common. Geologic mapping completed by BLM in 1995 indicates that 43% of the watershed is geologically "unstable" and another 12% is "potentially unstable" (Granfield Associates 1995).

MAP 1

HONEYDEW CREEK WATERSHED LOCATION



Climate can be broadly described as "Mediterranean" in terms of rainfall distribution. Winters are wet and cool, and summers very dry and hot with virtually no precipitation. Nearly all rainfall occurs between October and April (Fig. 1). The location and topography of the King Range result in a high degree of orographic (terrain-induced) lifting of storms approaching the coast, causing intense and heavy rainfall. Rainfall exceeds 100 inches annually and occasionally exceeds 200 inches (Fig. 2). The total amount of precipitation combined with the occasionally intense and prolonged rainfall events brings flood or near-flood events to the watershed frequently. Twenty-four hour rainfall totals on Wilder Ridge on the eastern boundary of the watershed periodically exceed 16 inches. Though almost entirely occurring as rain, precipitation in the form of snow occasionally occurs at virtually all elevations. Accumulations are rare with the exception of higher elevation shaded aspects along the King Range crest where moderate accumulations may persist. "Rain-on-snow" events rarely exhibit the catastrophic flooding in Honeydew Creek as occurs in other more inland northcoast drainages. A coastal climatic anomaly associated with the King Range is the general absence of summer fog, a condition responsible for the absence of redwood along this section of the California coast. Evidence of strong prevailing offshore wind patterns is found on ridgetop trees. "Flagging", or the wind-induced pattern of limb development on ridgetop Douglas-fir, point westward indicating an easterly flow. This wind pattern carries warmer inland air into the King Range during the summer months.

Figure 1
Monthly Precipitation
Wilder Ridge

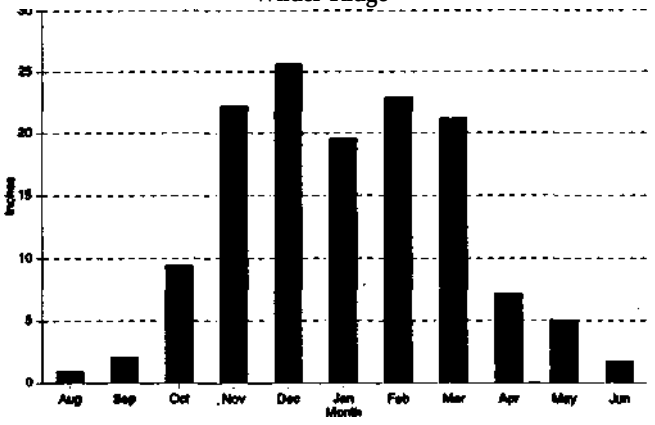
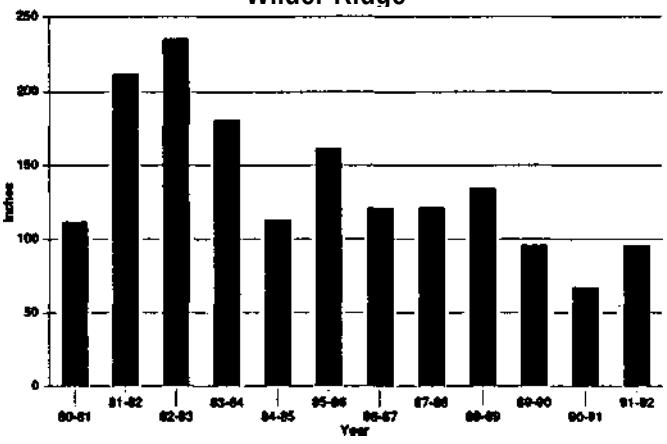


Figure 2
Annual Rainfall
Wilder Ridge



The combination of the dynamic geology, generally unstable and erosive soils, and very high and concentrated precipitation greatly increase the sensitivity of the watershed and its resources to various land use practices.

BIOLOGICAL

The public land within the watershed is allocated as Late Successional Reserve in the Northwest Forest Plan and exhibits a nearly continuous forest cover. Public lands within the watershed are 93% forested. The type is described as "mixed evergreen" with Douglas-fir as the dominant conifer species. Typically, forest stands include Douglas-fir in varying densities as the overstory component with tanoak and madrone understory. Other species in the mixed evergreen forest include bigleaf maple, California laurel, Pacific yew, chinquapin, and canyon live oak. Some drier sites within the watershed support scattered sugar pine. The mix of species is largely dependent upon soil type, moisture regimes, slope, aspect, etc.; however, the seral stage distribution throughout the watershed reflects the effects of fire, both natural and human-induced, and of land use practices. Most late successional forest stands occur near stream channels.

Wildlife species are typical of forested regions of the Pacific Northwest. Game species include black bear, California quail, blue grouse, band-tailed pigeon, gray squirrel, and feral pig. Federally listed species include northern spotted owl, marbled murrelet, peregrine falcon, and bald eagle. Three owl territories are known in the watershed. No marbled murrelets have been observed. Peregrines and bald eagles have been observed but are not known to nest. Other "species of concern" known or suspected are the southern torrent salamander, northern red-legged frog, tailed frog, western pond turtle, red tree vole, goshawk, and pileated woodpecker. The watershed is a Key Watershed under the Northwest Forest Plan and supports four anadromous and one resident fish species. These include steelhead, chinook salmon, coho salmon, Pacific lamprey, and three-spined stickleback. Coho salmon and steelhead are proposed for federal listing as threatened.

No known federally listed plant species occur. The Northwest Forest Plan lists species which require additional management considerations beyond standards and guidelines for the general land allocations. These species are known as "Survey and Manage" species and include vascular and non-vascular plants, bryophytes, amphibians, mammals, mollusks, and arthropods. The vascular and non-vascular plants have been surveyed in the King Range. Of the several hundred vascular and non-vascular plants identified, one vascular and 5 non-vascular plants are from the Survey and Manage list. (See Appendix B)

HUMAN

Little is known about the indigenous peoples of the Mattole watershed. The original inhabitants, the Sinkyone and the Mattole, respectively, occupied the Mattole headwaters and the lower main stem. Tribal boundaries are often unclear in the literature, but apparently the Honeydew Creek watershed included a possible boundary between these two peoples, though various reports indicate that the Wailaki, inhabitants of the Eel River watershed, also utilized the Honeydew Creek watershed (Baumhoff 1958, Kroeber 1960). There is evidence that the Wailaki travelled

to the ocean to access marine resources and probably passed through Honeydew Creek along some route, possibly along the current routing of the Smith-Etter Road (Anders 1995 - Appendix A).

The influence of the northwest salmon culture is seen in the (at least seasonal) reliance on salmon, the use of building materials, the architecture of their dwellings, and the use of canoes for hunting marine mammals and fishing in the ocean. The influence of Central California Pomoan culture is seen in the major role of acorns in their diet. Animals used by native Americans included black-tailed deer and Roosevelt elk as food sources as well as other animals. Bones, sinews, intestines, and other animal parts were used to make tools and other valued goods. Waterfowl and other birds were used for food and clothing. Animals had great spiritual significance to early peoples. Many spiritual rituals and traditions were based on animal behavior and functions within the ecosystem and animal parts were used as well.

Though the exact affiliation of the inhabitants is subject to speculation, it is clear that the inhabitants to advantage of fire to maintain certain attributes of the ecosystem which were of importance to them (Anders 1995). Likewise, after European settlement, the use of fire is known to have continued into the modern era.

During early settlement, ranching, agriculture, and timber were the major industries in the Mattole watershed, and of the Honeydew Creek watershed, occurring as small-scale operations primarily to supply local demand. The familiar sequence of overutilization of the resources began following the modernization of these industries, particularly the timber industry, after World War II. The expansion into regional, as opposed to local, markets dramatically increased the rate of timber harvest and readily accessible areas were logged with little regard for impacts to the watershed. In Honeydew Creek, however, the extreme topography and unstable slopes of the headwaters prevented exploitation of much of the upper watershed.

Residents depend upon the water supply from Honeydew Creek for a variety of beneficial uses. Residential domestic water use is very limited or may not occur. Most residential water usage depends upon springs or wells. Minor use for livestock watering occurs on the lower main stem and East Fork. Primary beneficial uses include direct contact for recreational use and anadromous fish.

Though the economies of the Mattole Valley stretch beyond the watershed boundaries, the principle land uses play a large role in the social makeup. As is typical throughout much of southern Humboldt county, however, land uses have shifted dramatically with the changing demographics of society as a whole, as well as the influx of urban settlers since the late 1960s and 1970s. Recreation use continues to increase throughout the King Range and the Honeydew Creek watershed and a roadless portion is identified as a Wilderness Study Area. Large tracts of industrial forest land have been subdivided and now support "homesteads" of the "new settlers". Among other terms, this movement has been dubbed the "back-to-the-land" movement. From interviews with these residents, Anders details their own perceptions of this lifestyle and its interactions with the environment:

> The major motivating value is the desire to relearn how to live on the land in a way that would meet minimal human needs without causing permanent damage to the natural environment. Accompanying these changes has been the emergence of a change in the consciousness and a new regard for the values inherent in the landscape among this group. These values focus on the health of the ecosystem and a general concept of living in the watershed. Residents observe that fish and wildlife habitats and the health of these watersheds have been degraded by over-utilization of resources. Within the Mattole a restoration culture has emerged which takes great interest in land use practices and with the restoration of degraded resources. The traditional ranching families and timber interests, and their economic orientation toward management of the landscape remain a major component in the social environment of the watershed, but throughout southern Humboldt county, based on the numbers of restoration initiatives and environmental organizations founded, financed, and maintained by the "back-to-the-landers", a shift in environmental attitudes has occurred (Anders 1995).

From a landscape perspective, these small-tract residential developments tend to fragment habitats, exacerbate sediment problems from roads and driveways, and render potential cooperative management efforts ineffective due to the sheer numbers of owners and their myriad land-use objectives.

Chapter Two
ISSUES AND KEY QUESTIONS

WATERSHED-SPECIFIC ISSUES

Anadromous fish habitat and populations in Honeydew Creek

1. How has anadromous fish habitat changed since 1850? Since 1950?
2. What is the relative importance of Honeydew Creek to the fish populations in the Mattole River?
3. What role can road rehabilitation play in restoration of fish habitat in Honeydew Creek?
4. How have fish populations changed since 1950?
5. What activities can BLM undertake to improve fish habitat in Honeydew Creek?

Roads and transportation system

1. Which roads in Honeydew Creek watershed are necessary to keep open for purposes of BLM and private landowners?
2. Which roads are maintained in a way that does not meet the objectives of the Aquatic Conservation Strategy? How can BLM change the maintenance of these roads so they are up to standards?
3. Which unnecessary roads, landings and skid trails are high priority for potential restoration projects?
4. What considerations should BLM take into account when developing the Transportation Plan required by the ROD?

Fire management

1. What is the natural role of fire in the watershed?
2. Is fire currently acting as a natural process affecting the ecosystem?
3. What are the limitations to maintaining fire in its natural role?
4. Where are the priorities for fire suppression within the watershed?

Developed and dispersed recreation

1. Are any existing developed campgrounds inconsistent with the Aquatic Conservation Strategy or other standards and guides in the ROD?
2. Are existing pedestrian and equestrian trails consistent with the objectives of the Aquatic Conservation Strategy, and other standards and guides the ROD?
3. What considerations should BLM take into account when planning for future recreation use?

Livestock grazing

1. What is the extent (number of animals, types of animals and number of acres) of historic grazing in the Honeydew Creek watershed?

2. What is the extent of current grazing?
3. What have been the effects of grazing and associated land uses on the vegetation? the streams?

Habitat for wildlife, especially endangered species

1. How much late-successional/old-growth (LSOG) habitat is there now and how is it distributed?
2. How much LSOG habitat occurred in the watershed historically and how was it distributed?
3. How much LSOG could potentially be there in 25-50 years?
4. What management actions could be implemented to accelerate development of LSOG and where should these actions be placed?
5. How will the LSOG potential meet the objectives of the Northwest Forest Plan?
6. How does management for LSOG affect other species management such as deer and how will that affect deer hunting opportunities for the public?
7. How well does the current condition of the forested landscape provide for connectivity between LSOG stands within the King Range NCA and between the KRNCA and adjacent Late Successional Reserves (LSR)?

Water Quality

1. Are there any toxins which affect water quality in Honeydew Creek?
2. Are there any water quality problems which limit beneficial uses of water in Honeydew Creek?
3. What role does Honeydew Creek play in Mattole water temps?

Wilderness Management

1. Are there sensitive areas where recreation or visitor use should be restricted or prohibited to preserve the identified wilderness characteristics?
2. What recommendations from the watershed analysis should be included in the wilderness management plan and fire management plan?
3. How can fire be used to enhance or maintain wilderness characteristics?
4. What major restoration projects require the use of mechanized equipment and should be considered prior to potential wilderness designation?

STANDARDIZED CORE QUESTIONS

1. What are the current conditions and trends of the dominant erosion processes prevalent in the watershed?
2. What are the current conditions and trends of the dominant hydrologic characteristics and features prevalent in the watershed?
3. What are the current conditions and trends of the prevalent plant communities and seral stages in the watershed (riparian and non-riparian)?

4. What are the current conditions and trends of stream channel types and sediment transport and deposition processes prevalent in the watershed?
5. What are the current conditions and trends of beneficial uses and associated water quality parameters?
6. What are the current habitat conditions and trends for the species of concern identified in steps 1 and 2.
7. What are the current conditions and trends of the relevant human uses in the watershed?

Chapter Three
REFERENCE CONDITIONS

Erosion Processes

As noted previously, there are three natural watershed processes which contribute to high background rates of erosion and sedimentation. The area is subject to high levels of seismicity, extremely high seasonal and year-event rainfall, and incompetent soils. These provide three conditions which increase erosion rates; "oversteepening" of slopes, high runoff, and erodible substrate. Though it is difficult to find data sources to reconstruct reference conditions, some data is available. *Dynamics of Recovery* (MRC 1995) uses aerial photographs and recollections of old-time residents to conclude the following regarding the pre-disturbance erosion (i.e. before extensive logging and road construction) and sedimentation. Conditions in the Mattole River channel are described as:

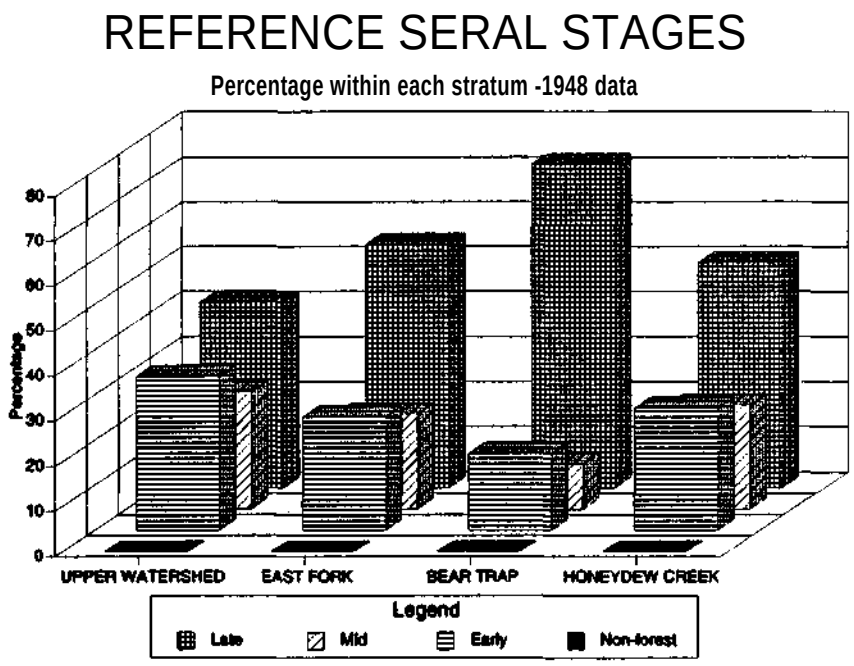
- narrower channel with a higher ratio of island floodplains to bars
- larger and deeper pools (especially in the lagoon)
- much coarser substrate, both in the active channel and on bars
- higher densities of conifers and cottonwood trees on floodplains

All of these observations infer that pre-disturbance erosion was less historically. *Landslide and Erosion History* mapping completed by Natural Resource Management Associates (NRM 1995) documents landslide and inner gorge erosion through photo interpretation. Six photo years are analyzed between 1947 and 1992. The 1947 sequence was prior to significant road building or logging in the watershed. Only seven landslides are detected. Those occur in the UPPER WATERSHED, the steepest and most inherently erosive terrain in the watershed. One major slide is the Heart-shaped slide and covers over 500,000 square feet. The number of slides, both old and newly activated, remains relatively constant until the 1966 photo sequence. Twenty-one slides are evident in the UPPER WATERSHED, 21 new slides in BEAR TRAP, and 51 new slides in the EASTERN WATERSHED. Extensive logging and roading preceeded the 1964 flood providing a backdrop for an apparently huge pulse of sediment input into the watershed, sediment which ultimately deposited in the mainstem of the Mattole. As the logging boom and new road construction subsided, fewer and fewer slides are detectable from the aerial photography through 1992. By that time only nine slides are detected in the UPPER WATERSHED, 23 in the EASTERN WATERSHED, and only six in BEAR TRAP. Only two slides in the entire watershed show recent enlargement, the Heart-shaped slide and the Recovery slide[1]. This data supports a concept that most of the massive sediment inputs resulting from logging have already occurred and that the landscape has, and continues, to recover from these impacts. Apparently the two major slides, Heart-shaped and Recovery were the only significant

[1] The Recovery slide is not detected in the 1947 photos. *Elements of Recovery (MRC* 1989) identifies the slide as the single largest point source of sedimentation in the watershed, noting its activation following both floods. MRC also cites vegetal and geomorphic evidence that the slide was active around 100 years ago.

landslides historically. Numerous small inner gorge slides probably occurred during major flood events.

Figure 3



Vegetation

Vegetation assemblages and seral stages of the mixed evergreen forest historically formed an intricate mosaic that occurred primarily in response to moisture available to plants and to lightning fires and fires set by indigenous people. Large continuous stands of late-seral or old-growth (LSOG) forests that occurred in the Pacific Northwest were thought to be absent from this area (Barbour and Majors 1977). The only reliable source of data for the pre-logging/roading era is from 1948 (USDA 1952). Labelling of forest types was put into categories to mimic as closely as possible the current WHR system. (Map 11, Page 56) Seral stage estimates were made and are graphed (Figure 3 and Table 1). The UPPER WATERSHED seral stages are similar in proportion to the current conditions (Figure 10 and Map 10) with a slightly lower overall percentage of late-successional forest. This may reflect the frequent reported use of fires by ranchers to create feed for sheep grazing. Conditions in the EASTERN WATERSHED and BEAR TRAP; however, are completely inverted from the current conditions graph. BEAR TRAP was 72% late-successional in 1948 and contains none currently. The EASTERN WATERSHED was 54% late-successional and is only 12% currently. Under natural conditions, the frequency of fire in the UPPER WATERSHED, a process which remains

relatively intact today, created a more even distribution of seral stages, whereas the other strata apparently experienced lower fire frequencies and maintained most of the late-successional forest stands. The 1948 vegetation mapping reveals greater interspersion of the seral stages in both EASTERN WATERSHED and BEAR TRAP. The vegetative mosaic has a patchier appearance. These patches have since been homogenized by timber harvest and regrowth. The reference UPPER WATERSHED interspersion is similar to the current conditions, with LSOG forest occurring mostly along major drainages and north slopes, while the upper one-third of the slopes display lower seral stages due to fire. Interviews with residents suggest that the understory was kept more open than current conditions. This perception may be skewed by the overgrown appearance of previously harvested areas where young brush and trees dominate. In the UPPER WATERSHED, where a natural fire regime prevails, understory conditions remain relatively open. Prescribed fire was definitely a tool used primarily by the ranching population in the watershed. The practice was apparently more common elsewhere in the Mattole where natural grasslands were more prevalent and more livestock were raised. Various accounts of how the burns were managed seem to converge on generally cool, late season burning which was initiated in the lower elevations and allowed to burn out as it progressed higher in the watershed (Anders 1995). Vegetation mapping from 1947 shows no evidence that any of these burns were stand-replacing as they progressed to the top of the watershed. Current mapping indicates only one area of higher elevation mid-seral Douglas-fir which was apparently the product of a human-origin fire progressing from east to west (or north to south). The burn does not have the characteristics of the frequent ridgetop-origin burned areas along the King Crest.

It is recognized that a comparison with only one other pre-logging era data point cannot provide a basis for describing a complete natural range of variation in conditions. The attempt here is to merely draw distinctions between the pre- and post- logging era conditions.

Table 1. Soil-Vegetation Mapping
and Seral Stage Estimates
Percentage by Strata - 1948 data

Forest Seral Stage	Veg Type	Watershed Strata						Entire Watershed	
		BEAR TRAP (%)		EASTERN WATERSHED (%)		UPPER WATERSHED (%)		HONEYDEW CREEK (%)	
		Type	Seral	Type	Seral	Type	Seral	Type	Seral
Late	Old Growth	60	72	48	54	39	41	45	50
	Old Growth (Open)	12		6		2		5	
Mid	Young Hardwood	6	10	13	21	11	26	12	23
	Mixed Stands	4		8		15		11	
Early	Non-timber w/comm trees	0	7	8	12	17	33	11	21
	Young Conifer	7		4		11		7	
	Brush	0		2		5		3	
Non-Forest	Grass	10	1	11	11	1	1	6	6
Totals		99	99	100	100	101	101	100	100

Species and Habitats

Aquatic Habitats and Fish

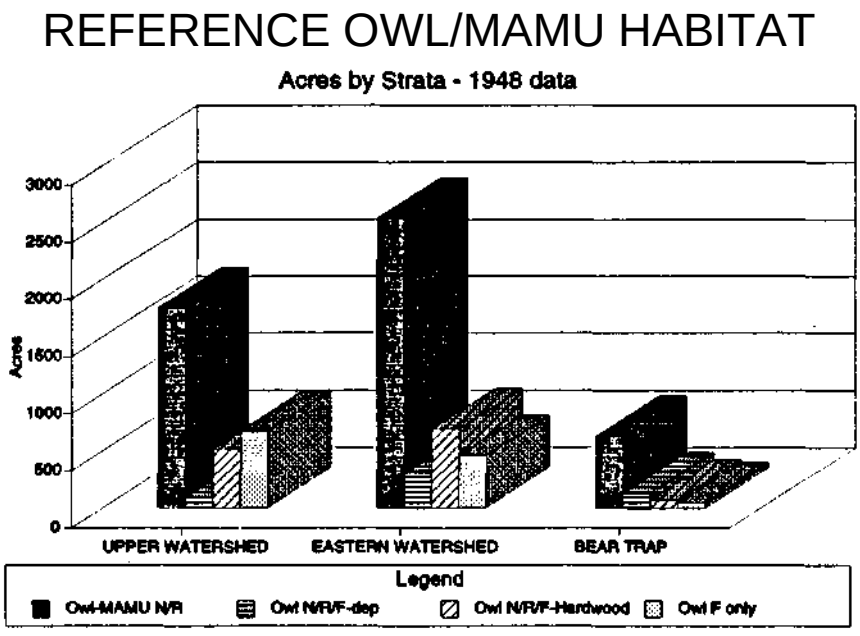
Anecdotal information was solicited from local residents by Anders (1995). Accounts of salmonid use mirrors accounts from most watersheds in the Pacific Northwest. For people living in these watersheds, the salmon species were a large part of their lives and they have vivid memories of their abundance. These include childhood memories of their fathers or grandfathers bringing home large salmon and of encounters with many fish at swimming holes and at road crossings. Figure 3 depicts the deterioration of salmon escapement levels since the 1980s, but

it is apparent the graph only captures the recent trajectory of this decline. Prior to the huge sediment influxes of the 1955 and 1964 floods, the mainstem of the Mattole River presumably supported abundant runs of chinook salmon, and estuary conditions provided for the survival of these fish, as well as summering coho salmon, until the bar opened and they were able to enter the ocean. These conditions are no longer favorable for salmonids primarily due to extremely high summer water temperatures, a product of a heavily sedimented lower river channel. *Dynamics of Recovery* (MRC 1995) addresses these parameters. Higher gradient spawning fish, such as steelhead, continue to spawn successfully, but, like the salmon species are limited by lower river conditions during their out-migration.

Terrestrial Habitats and Owls and Murrelets

Anecdotal information regarding terrestrial wildlife species are limited to common species. Residents readily comment on the apparent abundance, or scarcity of deer, bears, coyotes, and small game, but have no recollections of forest species which have until the modern era gone largely undetected. Nearly all residents recall that deer were in abundance and there is general consensus that there are fewer deer today, more bears, more coyotes, and more mountain lions (Anders 1995). The level of prescribed fire that was used by residents and native Americans could have maintained cohorts of young browse species resulting higher deer populations. The wholesale lowering of seral stage through timber harvest would have had the same effect, creating potential for an all-time high in deer numbers during the 1960s and 1970s. Subsequent regrowth into mid-seral stages would temper deer production.

Figure 4



Historically, owl and murrelet habitat was much more available within the watershed. Though the UPPER WATERSHED contained roughly the same amounts of habitat as today, the other strata both contained significantly more habitat. The entire watershed now supports three owl territories, all within the UPPER WATERSHED. Historically, the watershed may have supported up to eight territories; three in the UPPER WATERSHED, two in BEAR TRAP, and up to three in the EASTERN WATERSHED.

Marbled murrelets are known to be less numerous in the southern portion of their range. Even habitat which is considered "suitable" per current definitions is somewhat marginal in quality in this watershed due to the unusual weather patterns and forest composition. As noted previously, redwood trees do not occur in the King Range due to the warm, relatively fog-free summer weather conditions. Quantifying the historic habitat utilization by murrelets is difficult. Approximately one-third of the suitable habitat has been surveyed and no murrelets have been detected. An assumption that murrelets ever utilized this habitat would be speculative and unsupported by current data.

Water Quality

Two sources of information are available which provide insight into summer temperature regimes in Honeydew Creek. An undated stream survey from the California Division of Fish and Game (possibly 1940s) states that Honeydew Creek "never warms up and stream carries a good flow all season", making it a prime location for late stocking of fish. Anecdotally, in Anders (1995), in an interview with one long-time resident, the following references were made to water temperature.

> (She) had firm memories about the change in the temperature of Honeydew Creek. It is currently much warmer than it was when she was a child. She recalled that the temperature of Honeydew Creek was so much colder than the temperature of the Mattole, at the confluence, that you could easily move from the cold to the warm water for swimming. She said that she loved swimming in the Mattole, rather than Honeydew Creek for that reason. At present, when she goes wading in the lower mainstem, she said that she can scarcely detect a difference between its temperature and that of the Mattole.
>
> (She) placed the beginning of the temperature change as early as about 1981, when her parents went from sheep ranching to raising trout in ponds. She said that they monitored the temperature in the creek near their home and she recalled their amazement that water temperatures would reach 80 degrees in the creek in July, a level they knew from their trout raising experience was fatal to trout. (She) attributes the rise in temperature to both the straightening of the creek and the loss of riparian cover upstream. She said that although alders are thick in places now, they are thick over the riffles, not over the ponds, so that they are basically ineffective as shade to cool the water.

Stream Channel

Cursory examination of 1940s aerial photography of the Mattole basin shows narrow, tree-lined channels, much in contrast to what is found today. Although no specific information is available,

it is assumed that stream channels in the Honeydew watershed were, for the most part, narrow and vegetated except where naturally occurring landslides affected channel segments.

Channels in the UPPER WATERSHED probably look very similar today as they did in 100 years ago. Channels in BEAR TRAP and the EASTERN WATERSHED have been most affected by land use. Higher gradient channels found at upper elevations are able to transport sediment loads downstream and thus show less long term effects from large scale erosion than lower gradient (<5%) channels that tend to store sediment for decades.

Human Uses

Little is known for certain about the original inhabitants of the Mattole watershed. Ten years after contact with Euro-Americans in the mid-1800s, these people had been virtually eliminated by disease and genocide. They are commonly referred to as the "Sinkyone", a name given them by early ethnologists, and belonged to the Athabascan language speaking group of people. The watershed apparently was split along some boundary, perhaps the Bear Trap Ridge, between the Sinkyone to the south and the Mattole to the north. What little is known of the lifeways of these people is based on sketchy accounts of early explorers and settlers, interviews with elderly Sinkyone survivors, commonalities with other indigenous groups to the north and south, and archaeological evidence.

They are considered by ethnologists to be "transitional people", the southernmost to share the Northwest salmon culture. The influence of northwest salmon culture is seen in the reliance on salmon, the use of building materials, the architecture of their dwellings, and the use of canoes for hunting marine mammals and fishing in the ocean. The influence of Central California Pomoan culture is seen in the major role of acorns in their diet.

There are no archaeological sites recorded within the watershed. A village site on the west side of the mouth of an unnamed intermittent stream less than 1/5 mile west of the Honeydew Creek outlet (Baumhoff 1958), one of numerous sites along the length of the Mattole. The site is just outside the watershed boundary on private land. There are differing opinions among researchers as to the tribal affiliation with the site - some claiming Mattole and others Sinkyone. Regardless, there is evidence that a significant indigenous population utilized the watershed, maintained long-term occupation, and probably manipulated those resources to meet their needs for food shelter and other raw materials. (It is interesting to note that the aboriginal population estimated by Baumhoff at 5-7 inhabitants per square mile brackets the current population estimate by Anders of 5.7 inhabitants per square mile.) Two additional sites, just outside the watershed boundary on Wilder Ridge, contain chert flakes (BLM site records). One site is scattered and shows no evidence of continuous occupation. The second site has a very dense chert flake site, with chert cores, flaked tools, projectile points, and possible midden development, indicating potential for long-term occupation. The age of the sites and their relationship to the more recent indigenous cultures is unknown.

It is assumed that the cultures used the area on a seasonal basis, travelling to the coast to utilize shellfish in winter and spring, harvesting surf fish or kelp in the summer, travelling to the

interior to harvest acorns in the late summer and fall, and camping along the Mattole to harvest the winter salmon run.

Seen in this context of resource availability and long-term occupation, the impacts of the cultures on the landscape should be assumed to be similar to those of other indigenous groups in pre-Euro-American California.

Fire was by far the most powerful tool available to native Californians. Fire has the most potential for profound effects on the landscape; however, native Californians utilized fire in very specific situations for very specific purposes. In oak woodland habitats, fire was used, in the late summer and fall after the first wormy acorns had fallen to the ground. Fire applied at this time not only cleared the understory of brush, making it easier to gather the acorns that fell later, but killed acorn worms which would have infested the next years crop (Raphael 1974). Burning conditions on the northcoast would have limited the extent of this use of fire.

Grass and forb seeds, as well as acorns, were a staple of many native Californian diets. Fire was applied to pinole fields (the seeds of several different species of perennial grass were used as grain) after harvest to ensure abundant growth the following season. Fire was used, along with tillage, to maintain bulbs, corms, and tubers utilized as food resources (Brodiaea. Allium. Perideridia. Camassia. and Calochortus species, among others). Fire also was used to maintain coastal prairies as open grassland and as productive elk and deer hunting areas; recent research has demonstrated that the majority of the coastal prairie habitat was "anthropogenic" in nature and quickly reverted to woody vegetation after Euro-American settlement (Bicknell 1992).

Native Californians were highly skilled basket makers. Most storage, cooking, and food processing implements, as well as nets, snares, and weirs used for fishing and hunting, were woven baskets of plant materials. The variety of materials used to construct baskets is quite large: willow, hazel, redbud, huckleberry, ocean spray, and many other shrub stems, beargrass, wild iris, sedge roots, fern fronds, and stems, seed stalks, and rhizomes from many different forbs, grasses, sedges, and rushes. The procurement of these items required active manipulation of each plant source to produce quality construction materials, usually epicormic or adventitious shoots (i.e., young growth) for the intended use. The techniques used to produce the desired materials included: burning, pruning and coppicing shrubs to encourage sprouting of straight shoots, burning and pruning grasses to produce long straight stalks and to remove old plant material, tillage and weeding of basket sedge patches to encourage the formation of long straight rootstalks.

The management techniques used and the procurement of plant resources to meet the needs of native Californians could have significant impacts on the landscapes. Much has been written of the open, mixed conifer Sierran forests and the open understory of the vast California oak woodlands at the time of Euro-American contact, as examples. The impact of indigenous land uses on the Honeydew Creek watershed was probably not as extensive as elsewhere in California, but rather localized in areas of consistent, long-term use and habitation, such as the lower gradient reaches of the lower mainstem near the confluence with the Mattole, the lower

East Fork, and lower Bear Trap Creek.

The landscape and plant communities of Honeydew Creek probably were influenced, to some extent, by the domestic activities of the original inhabitants, which are presumed to have been seasonal in nature. The effect of indigenous management is unclear, though numerous sources suggest that indigenous use of fire maintained a more open understory beneath the Douglas-fir/tanoak forests as a result of acorn management activities and as a result of the management and collection of construction materials. The extensive use of fire on the northcoast would have been problematic for these people.

Although indigenous use and management probably influenced the character and composition of the landscapes in lower elevation, lower gradient reaches of Honeydew Creek, the majority of the watershed was most likely not influenced significantly. Most areas are too steep for human habitation and concentration of human impacts. Ridgetop routes may have been used as travel corridors between inland and coastal resources though Greenway (pers. comm. 1995 - See Anders 1995 Appendix A) suggests that, prior to modern trail construction, even these routes, such as the King Crest and Rattlesnake Ridge, were too steep to have suitability as travel routes.

Chapter Four
CURRENT CONDITIONS

STRATIFICATION OF THE WATERSHED

An assessment of the physical characteristics and processes, land use patterns, and ownership provides an expedient basis for stratifying the Honeydew Creek watershed into three strata. Throughout the text these strata are identified in upper case to prevent confusion with references to specific tributaries.

EASTERN WATERSHED: This portion of the watershed includes the entire East Fork, the mainstem below the confluence with the East Fork, and High Prairie Creek. It includes 5,410 acres of which 2,313 acres (43%) are public lands and 3,097 acres (57%) are private lands. Of the current public ownership, 1,448 acres were originally private lands and were acquired into public holdings of the King Range National Conservation Area through exchange. Therefore a total of 4,545 acres (84%) were originally in private ownership.

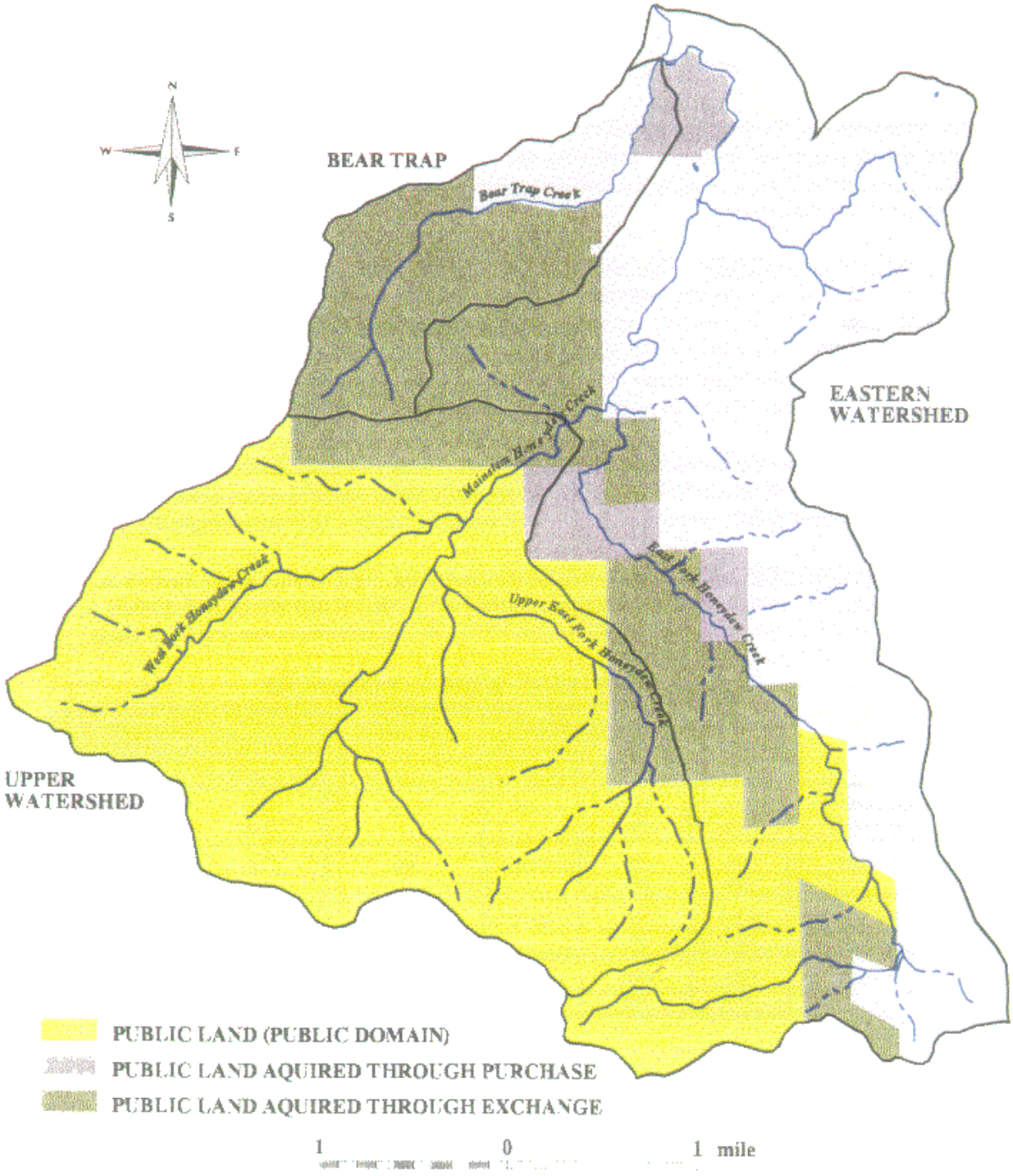
BEAR TRAP: This stratum includes the entire watershed area of Bear Trap Creek. It contains 1,074 surface acres of which 800 acres (74%) are public lands and 274 acres (26%) are private lands. All current public ownership consists of acquired lands which were originally private.

UPPER WATERSHED: The Upper Mainstem includes the West Fork, Upper East Fork, and the mainstem upstream from the confluence of the East Fork. It contains 4,517 surface acres which are 100% public lands. Only 440 acres (10%) of the watershed are acquired lands.

Table 2. HONEYDEW CREEK LAND STATUS

	CURRENT OWNERSHIP			ACQUIRED	HISTORIC OWNERSHIP	
	PUBLIC	PRIVATE	TOTAL		PUBLIC	PRIVATE
EASTERN WATERSHED	2,313 43%	3,097 57%	5,410	1.448	865 16%	4.545 84%
BEAR TRAP	800 74%	274 26%	1,074	800	0 0%	1.074 100%
UPPER WATERSHED	4.517 100%	0 0%	4,517	440	4.077 90%	440 10%
TOTALS	7.630 69%	3,371 31%	11,001	2.688	4.942 45%	6.059 55%

MAP 2
HONEYDEW CREEK WATERSHED



Scale 1:48000

GEOLOGIC CONDITIONS

As noted in previous documents, (USDI 1995, MRC and Twin Parks 1995) and in Characterization of the Watershed, the King Range is one of the most seismically active regions in North America. It overlies the Mendocino Triple Junction where the Gorda, Pacific, and North American tectonic plates form zones of subduction and shear. The area has some of the highest uplift rates in California, up to ten feet per 1,000 years. (MRC 1989) The marine sedimentary rocks have undergone extensive deformation in their journey from the ocean floor. The mixing, folding, fracturing, and weathering of this parent material causes the rock to be incompetent and easily subject to erosive forces. These conditions are evident throughout the entire watershed. The "oversteepening" of slopes, caused by seismic uplift, coupled with the physical properties of the clay matrix Franciscan soils creates a highly erosive condition and much geomorphic instability. (See Bear Creek Watershed Analysis for discussion (USDI 1995).) Earthquakes, extremely high rainfall events, and to a lesser extent wildfires are natural disturbance mechanisms affecting stability.

BEAR TRAP

The BEAR TRAP stratum of the watershed exhibits the highest percentage of inherent instability with nearly % of the area mapped as unstable. This instability is mostly associated with earthflows and slumps on downstream areas of the watershed. Inherently unstable conditions here have been exacerbated by intensive grazing and type conversions on private lands.

EASTERN WATERSHED

Approximately 60% of EASTERN WATERSHED was classified as unstable or potentially unstable. Much of the lower watershed is similar to BEAR TRAP, with earthflows and slumps on lower gradient areas of the lower watershed and along slopes associated with the mainstem and High Prairie Creek. Instability is mapped along the entire inner gorge of the East Fork. Virtually all merchantable timber was removed from this stratum between 1954 and 1966, with the attendant road network (See Erosion Processes and Features).

UPPER WATERSHED

Instability in the UPPER WATERSHED is almost entirely associated with "oversteepened" inner gorges and with ridgetops along the King Range crest. These are areas of natural instability which have not been exacerbated by land uses. Slope angles above and below the King Range Road range from 45 to 120 percent, which often exceeds the angle of repose on natural slopes of 65-73% (MRC and Twin Parks 1995). Slopes along the King Crest have not been measured but are significantly steeper than those measured in the environs of the King Range Road. One major slide is evident in the UPPER WATERSHED. The slide is called the "Heart-shaped Slide" and lies in the upper headwaters of the mainstem of Honeydew Creek (unsurveyed portion T.3S.,R.1W, approx. sect. 24). The slide is apparently a natural event. Local knowledge suggests that this slide originated with the 1906 earthquake. The slide is visible in photos from 1942 and shows alternate periods of inactivity or enlargement through photo interpretation from 1947 through 1992 (NRM 1995). The feature remains unvegetated and undoubtedly plays a major role in the hydrologic (peak flows) and fine sediment regime of the

Upper Mainstem. It is the apparent source of significant inner gorge mass wasting throughout the period of record.

LAND USE PRACTICES, GENERAL SURFACE CONDITIONS, EROSION

EASTERN WATERSHED

The EASTERN WATERSHED is predominantly private land, with current private ownership of 3,097 acres or 57% of the stratum. This comprises 92% of the private lands in the Honeydew Creek watershed. Historically, the private ownership was 4,545 acres. Between 1974 and 1986, during the consolidation of the King Range National Conservation Area, 1,448 acres were acquired. Private holdings have experienced much different land use, both historically and currently, than public lands. Roughly 84% of the land area of the EASTERN WATERSHED was logged. The roading history, developed by BLM from aerial photo interpretation of five photo years (1954, 1963, 1966, 1973, 1980), indicates the primary period of logging and road building occurred here between 1954 and 1963. Prior to 1954, the watershed contained 17 road miles, which included the entire length of the Wilder Ridge Road and roads associated with ranches near the confluence with the mainstem.

Of 372 predicted (See footnote #1) stream crossings, only 18 occur on system roads, including those on the Bearwallow fuelbreak. One area of non-system logging roads is evident midway along the eastern boundary off Wilder Ridge Road (Area I, Map 7, page 30). This area of logging roads covers approximately 80 acres of the east slope of the East Fork with an additional spur road which sidehills into the inner gorge for approximately one mile and terminates in the creek. The only mapped area of inner gorge mass wasting evident from 1954 photography parallels this particular road (NRM 1995). By 1966, an additional 37 miles of road were mapped, essentially "roading" another 1,000 acres of terrain. Logging occurred throughout the watershed during this period with concentrated areas in the southernmost headwaters (Area II, Map 7), and extensively in the lower watershed in a 700-acre zone near the confluence of the mainstem (Area III, Map 7). These roaded areas have diversions and some areas of perched sediments, but are difficult to access and would be a low priority for rehabilitation. Few significant sediment sources remain (NRM 1996).

Table 3. ROAD MILEAGE and STREAM CROSSINGS

	ROAD MILEAGE (total miles)			ROAD DENSITY (miles/square mile)			PREDICTED[2] STREAM CROSSINGS			
	PD	ACQ	PVT	PD	ACQ	PVT	On Un-stable Lands	On Pot. Unstable Lands	On Stable Lands	Total
EASTERN WATERSHED[1]	3.2	17.8	33.8	2	8.1	7	160	44	168	372
BEAR TRAP	N/A	14.7	1.6	N/A	11.8	I	51	1	24	76
UPPER WATERSHED	7.4	8.3	0	1.2	12.2	N/A	23	1	53	77
WATERSHED TOTALS							234	46	245	525

PD - Public Domain ACQ - Acquired lands PVT - Private Lands

Mapping of Landslide and Erosion History from 1966 aerial photography (NRM 1995) would include the period of the two most recent catastrophic flood events, 1955 and 1964. Mapping reveals initial inner gorge mass wasting through 2 miles of the East Fork and additional inner gorge mass wasting through 3-3½ miles of tributaries to the East Fork. Excluding High Prairie Creek, fourteen new landslide areas occurred between 1954 and 1967. The largest slide, dubbed the "Recovery" slide, appears during this period. Local residents recall the first failure of this slide in 1955, followed by another period of activation in 1964[4]. The slide is a recurrent translation/debris torrent with a disturbed area encompassing nearly 40 acres. It is described by geologists as the largest point source of sedimentation in the Honeydew Creek watershed (Burnson, MRC 1989). The Mattole Restoration Council has been involved in extensive efforts to ameliorate the effects of this feature on the channel dynamics in the East Fork.

Excluded from this discussion due to incomplete aerial photography and road data are the effects of land use practices on the High Prairie Creek watershed (Area IV, Map 7). Excerpts from Elements of Recovery (MRC 1989) describe conditions on this tributary:

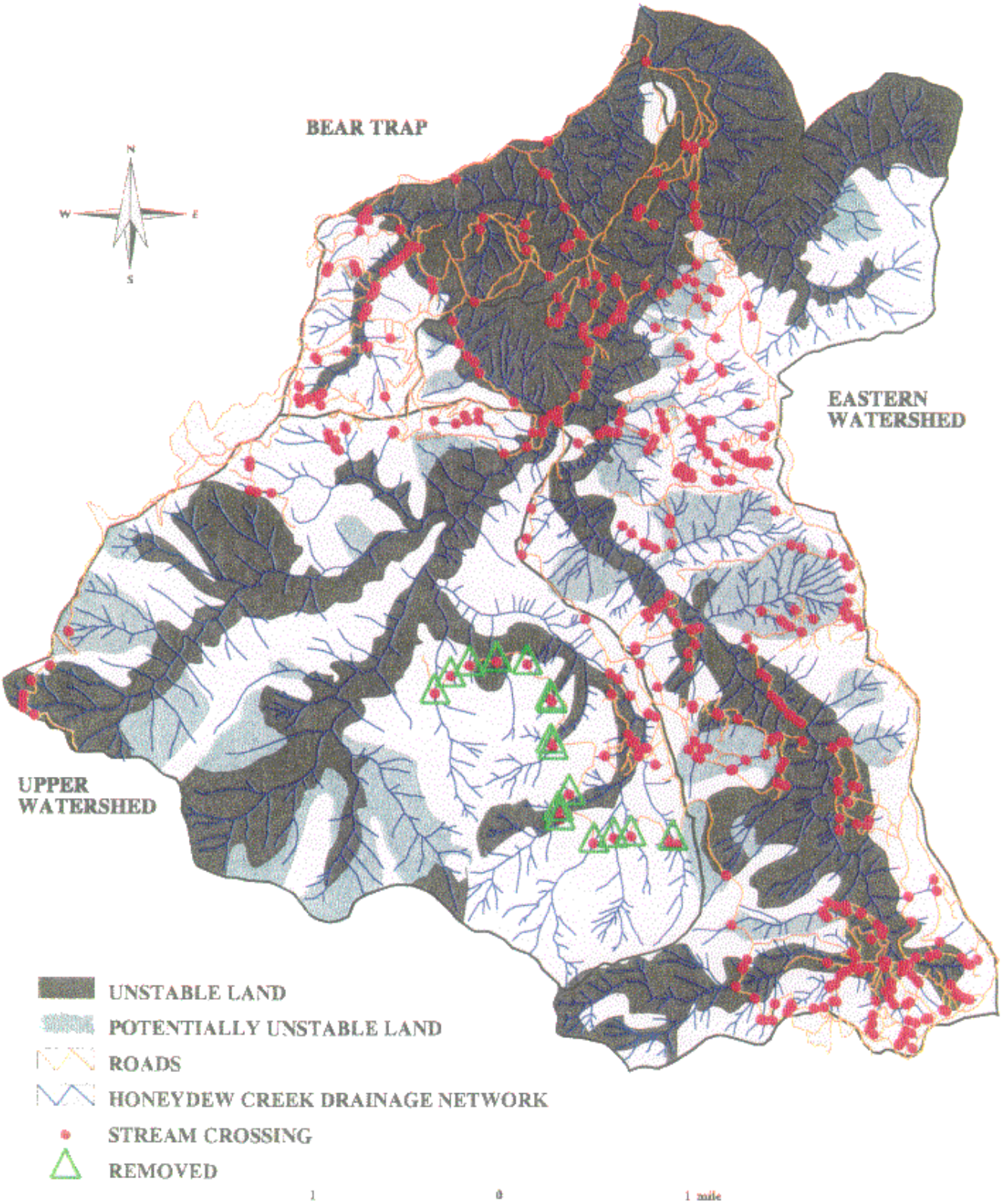
> High Prairie Creek is a 2-mile long perennial stream which enters Honeydew Creek from the east 1 ½ miles above its confluence with the Mattole River. The creek

[2]Stream crossings are predicted by using GIS to overlay the road network with the stream network. The intersection of a road and stream line is considered a "predicted" stream crossing.

[3]No aerial photography for road or stream data was available for High Prairie Creek. Actual road mileage for PVT will be much higher than shown in chart for EASTERN WATERSHED.

[4]Geomorphic and vegetal evidence suggest that this slide also failed about one hundred years ago (MRC 1989).

MAP 3
HONEYDEW CREEK WATERSHED
PREDICTED STREAM CROSSINGS



> drains an area of about 2.6 square miles.... Nearly all commercial timber was harvested over thirty years ago[5]. .....In the late 1950's, roads were pushed across the slopes to allow logging, greatly impacting their equilibrium [the equilibrium between hillslope processes and sediment transport]. Fifty percent of the roads subsequently failed; nearly seventy-five percent experience "adjustment" and are still seeking equilibrium. The stream channel was overloaded and aggraded in a short period of time, destroying riparian and fisheries habitats. The basin is now in a process of recovery and the stream carries high sediment loads."

Mapping of Landslide and Erosion History for the corresponding time sequence depicts the devastating effects of the major flood events which followed the disruption of the drainage network by logging and roading. Twenty-three new landslides are mapped from the 1967 photos, eight of which exceed 25,000 square feet in area and one of which exceeds 100,000 square feet. Most of the High Prairie Creek inner gorge shows mass wasting in 1967 compared to no mass wasting in the 1954 photo sequence.

Excluding High Prairie Creek, less than one additional mile of road has been built in the remainder of the watershed since 1967.

BEAR TRAP

The BEAR TRAP stratum of the watershed is the most heavily impacted of the three strata. Historically, it was entirely in private ownership with BLM acquisition of 74% of the surface acreage occurring in the early 1970s. A key issue here is the type conversion from forest to grassland. It is assumed from various literature accounts that the native-Americans used fire to cultivate specific crops, reduce understory vegetation, and maintain openings for hunting (Raphael 1974). And, from historical accounts, burning continued after European settlement primarily to control understory vegetation for sheep grazing. Many long-time residents refer to controlled burns set by individual ranchers or groups of ranchers (Anders 1995, See appendix). Accounts indicate that some expertise had developed and though escapes did occur, the goals were to maintain a more open understory for grazing and extensive type conversions were not occurring. Timber-vegetation mapping from 1948 depicts nearly the entire drainage as old-growth forest, presumably with a relatively open understory (USDA 1952). During the logging era, between 1954 and 1966, the area was not only logged and roaded during the same period as EASTERN WATERSHED, but was then periodically burned to maintain a type conversion to grassland for grazing. Road densities here are the highest in the Honeydew Creek watershed at 11.8 miles of road per square mile of landscape. One old-timer described burning and logging as follows, "We'd log a section and then burn and reseed it, and have good pastures, like the Indians."

In BEAR TRAP, these management practices occurred on inherently unstable terrain causing extensive changes to the hydrology and morphology of Honeydew Creek. By 1966, inner gorge mass wasting was occurring throughout the length of the Bear Trap stream channel and on

[5]Mapping from Elements of Recovery indicates that nearly all of the High Prairie Creek watershed was logged by 1962.

several tributaries. Twenty-two new landslides were mapped from the 1966 aerial photo sequence (NRM 1995). Of 76 predicted stream crossing, only 6 occur on system roads. A 1964 survey noted Bear Trap Creek was dry at the confluence with Honeydew Creek, likely due to a sediment plug mobilized by the 1955 flood. Today, Bear Trap Creek has a high proportion of sand/silt in the streambed. Current surveys note extensive grazing impacts and serious bank erosion. Eight-five percent of the landscape is now grassland or young hardwoods less than six inches in diameter with the remaining acreage in recently re-planted Douglas-fir.

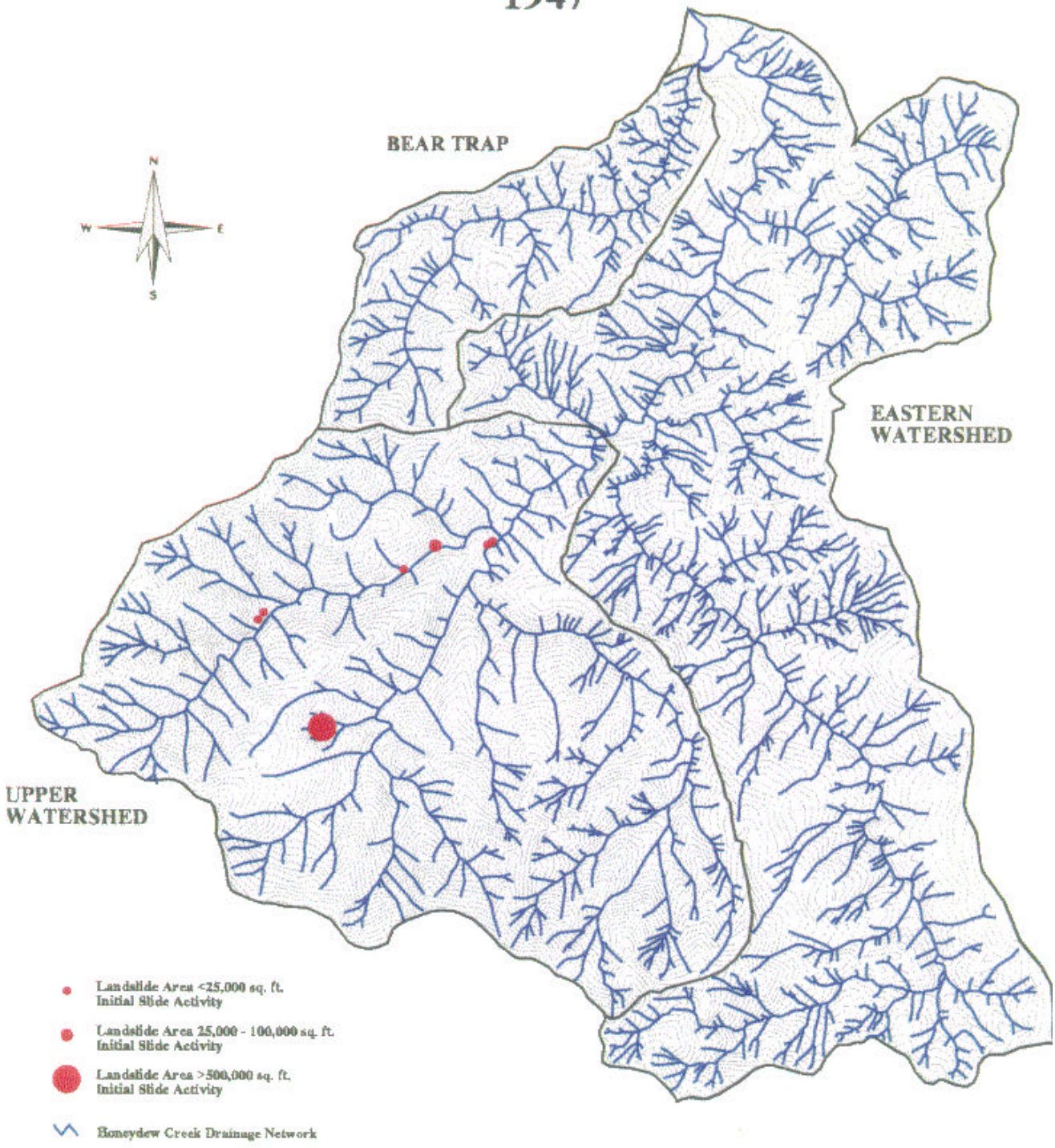
Past harvesting operations accessed timber in this area by constructing haul roads and skid trails from the ridges down into, and up from, the bed of Bear Trap Creek. These roads were constructed with almost no drainage structures. As a result, the majority of the road prisms, skid trails, and stream crossings in Bear Trap Creek have washed out with the floods in the 1960s and 1970s. The remnant inner gorge haul road in Bear Trap Creek has revegetated with alders, conifers, and other vegetation. Diverted channels created by upslope tributaries onto the old inner gorge road are stable, having already delivered their sediments. The vast majority of the skid road network has also stabilized and revegetated. One large landing along the western boundary of BEAR TRAP covers a class II watercourse. The approach to the landing also fills a class III tributary. Approximately 50% of the class II fill has eroded into the watercourse. Perched fill remains within the crossing and along the road. Perched fill still remains on a second landing at the end of the road (NRM 1996).

UPPER WATERSHED

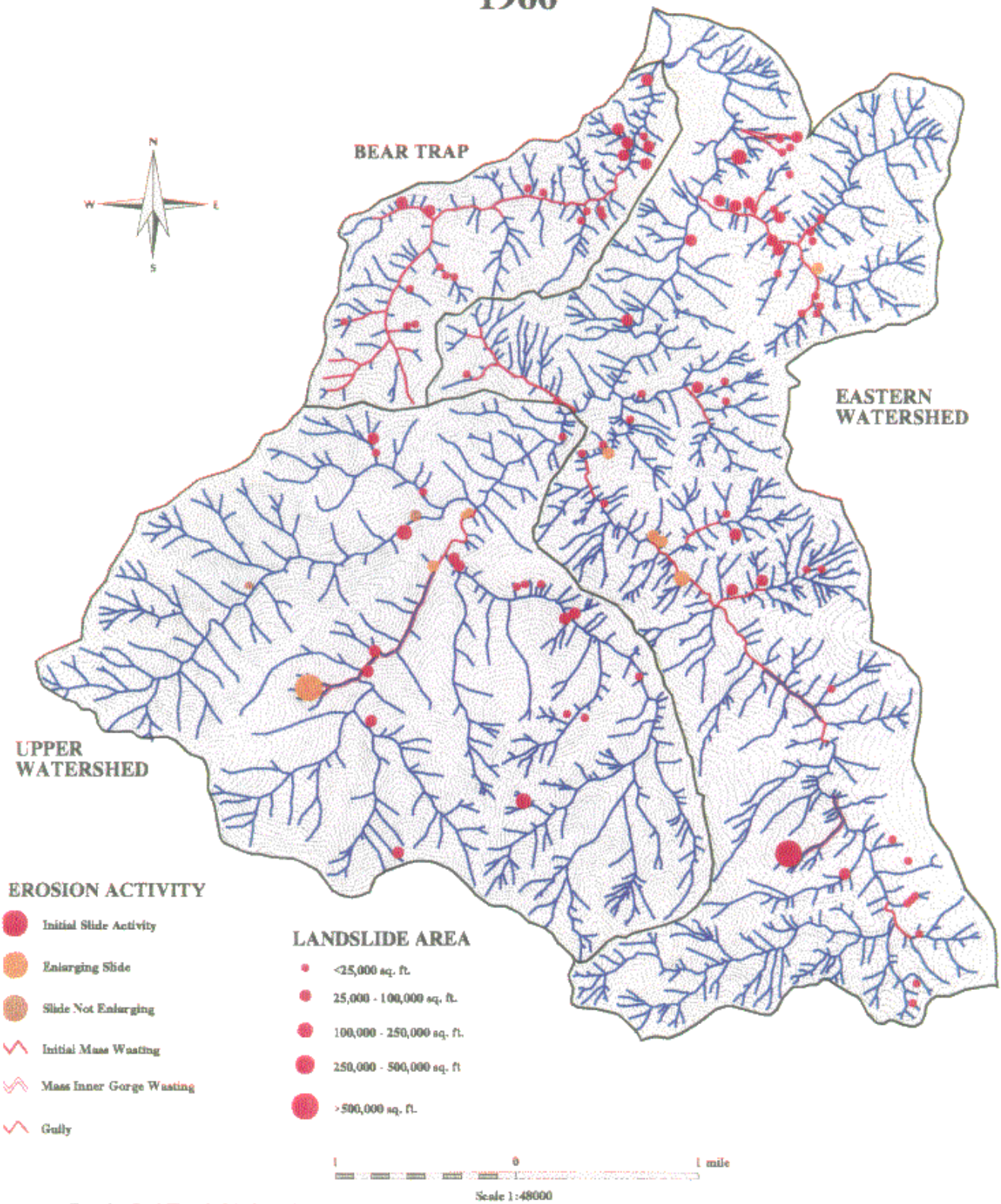
The UPPER WATERSHED is in nearly as pristine condition today as prior to European settlement. Ninety percent of the watershed was always in public ownership and was never logged. The remaining 10% which was originally in private ownership lies along the lowest elevation edge of the UPPER WATERSHED. Portions of these lands were logged and roaded between 1962 and 1974 (MRC 1989). Within the 10% of the watershed which are acquired lands, a road history compiled from five years of aerial photo interpretation (1954, 1963, 1966, 1973, 1980) shows two small roaded areas containing 65% of the road mileage (Areas V, VI, Map 7). Road density here averages 12.2 miles per square mile of landscape. On the original public domain, road density averages only 1.2 miles per square mile of landscape. 15.7 total miles of road occur within the UPPER WATERSHED (12.2 total miles after decommissioning of King Range Road). There are 69 predicted stream crossings of which 26 occur on system roads. Only 7 system stream crossings will remain after King Range Road decommissioning. Two areas of dense non-system roading occur as follows.

An area of the Upper East Fork includes approximately 214 acres lying mostly on the west slope of Bearwallow Ridge in section 30. (Area VII, Map 7) Four miles of roads and skid trails occur here. The roads and skid trails first appear in the 1963 photo sequence. Detailed mapping of Landslide and Erosion History (NRM 1995) shows no road history or inner gorge landslide activity through 1954. By 1966, 4 inner gorge slides of 25,000-50,000 square feet, and three slides of less than 25,000 square feet have been activated. In subsequent years through 1992, only one additional small slide has occurred and the initial slides are no longer enlarging. This indicates that most road-related depositions have already occurred and significant recovery

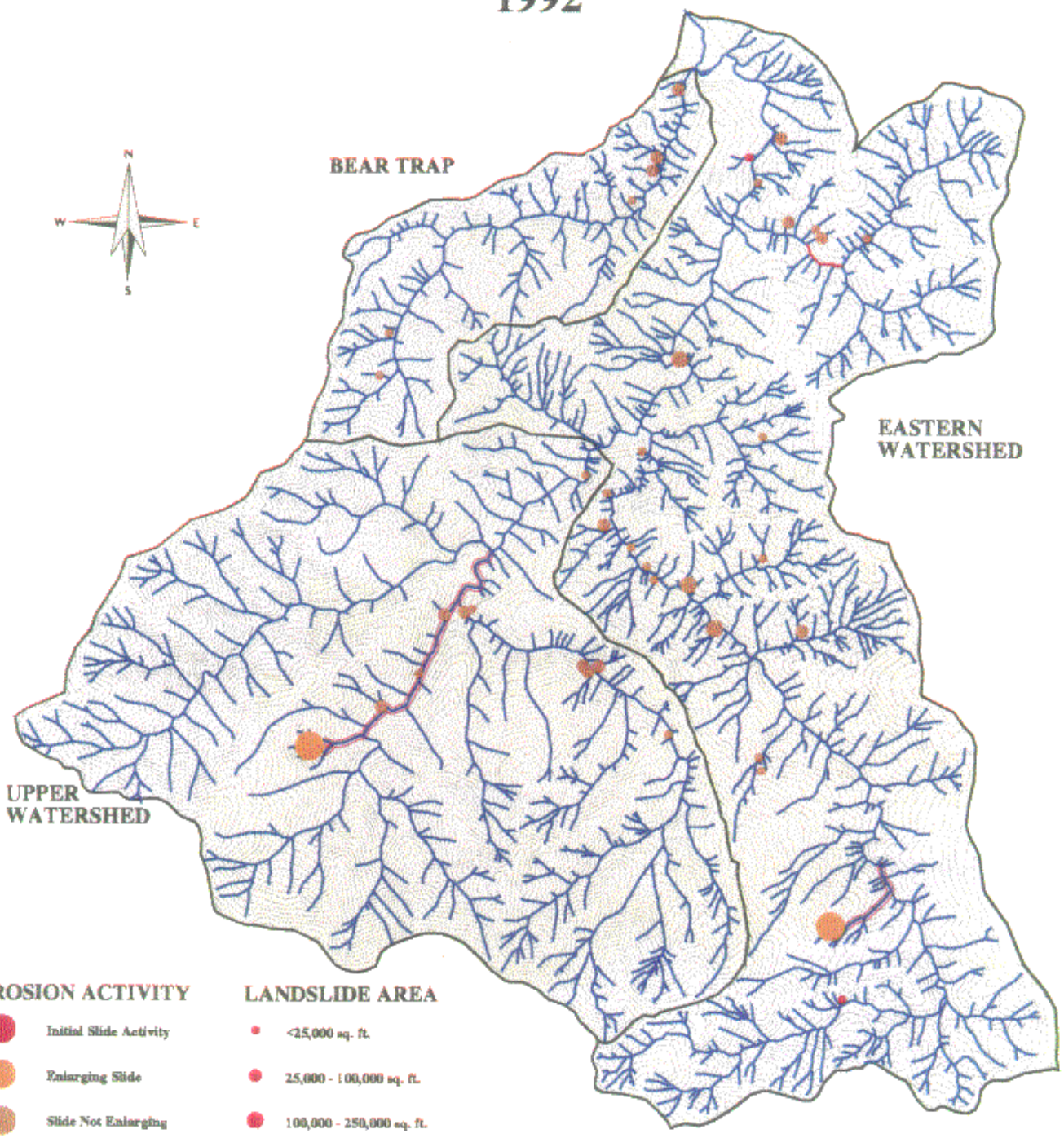
MAP 4
HONEYDEW CREEK WATERSHED
LANDSLIDE/EROSION HISTORY
1947



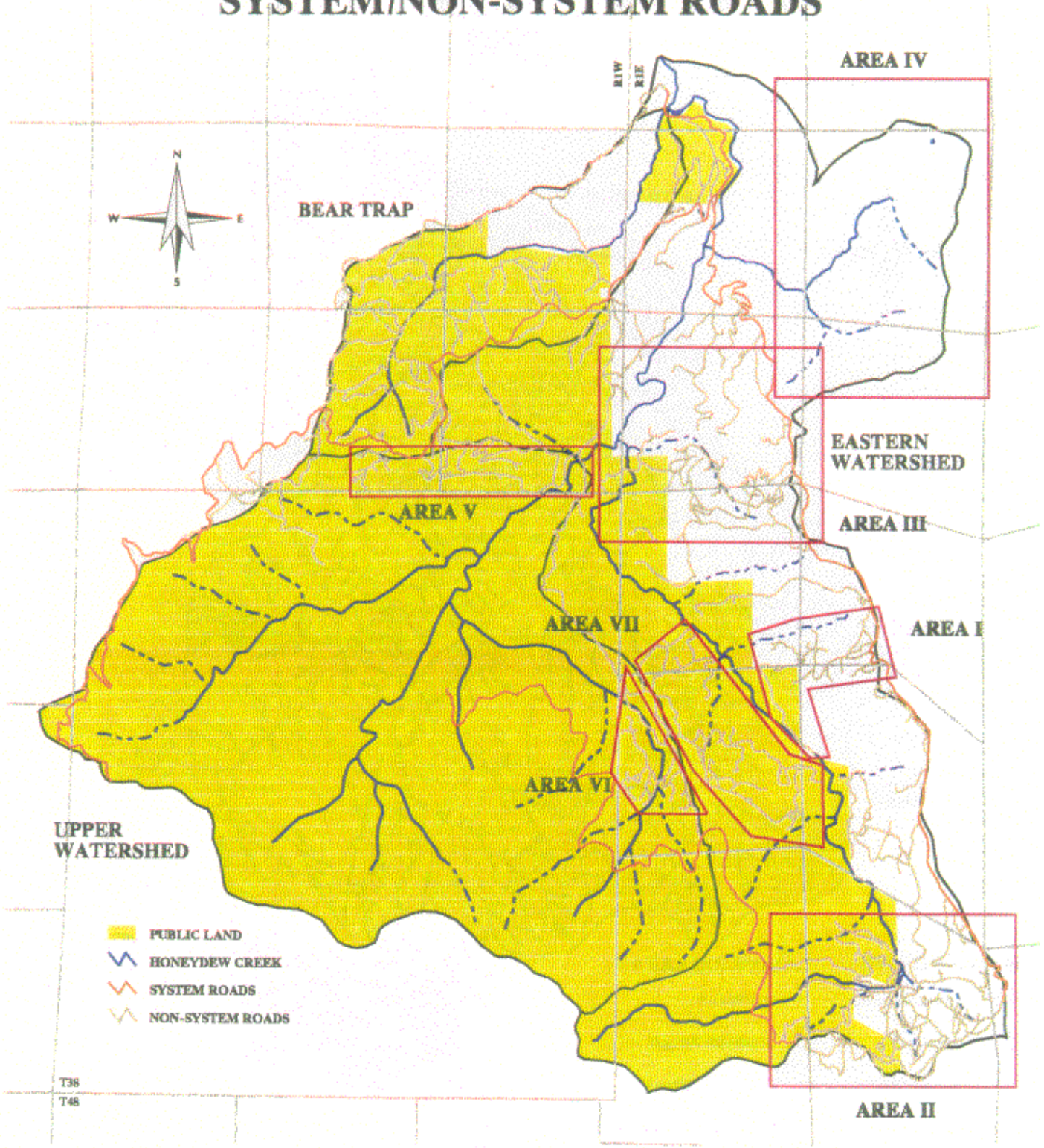
MAP 5
HONEYDEW CREEK WATERSHED
LANDSLIDE/EROSION HISTORY
1966



MAP 6
HONEYDEW CREEK WATERSHED
LANDSLIDE/EROSION HISTORY
1992



MAP 7
HONEYDEW CREEK WATERSHED
SYSTEM/NON-SYSTEM ROADS



Scale 1:48000

has occurred over the last thirty years. The remaining fills are for the most part stable and almost all of the landings support 20 to 30-year-old trees (NRM 1996).

The second area includes approximately 232 acres in the S½, S½ section 13 along an unnamed tributary which drains Bear Trap Ridge into West Fork Honeydew Creek. This site contains 5.2 miles of roads and skid trails. Roading in this area is an extension of high density road building in the BEAR TRAP stratum and first appears in 1963 aerial photos. Some expansion is evident in 1973 aerial photos. These same areas of acquired lands on Bear Trap Ridge were historically managed for intensive grazing. Type conversion from mixed conifer to grassland was maintained by the periodic use of prescribed fire. All stream crossings on these roads and skid trails have washed out and minimal perched fill remains near these crossings (NRM 1995). Forest soils which were historically subjected to type conversion have been replanted with conifers in the late 198()'s. This includes 15% of the stratum.

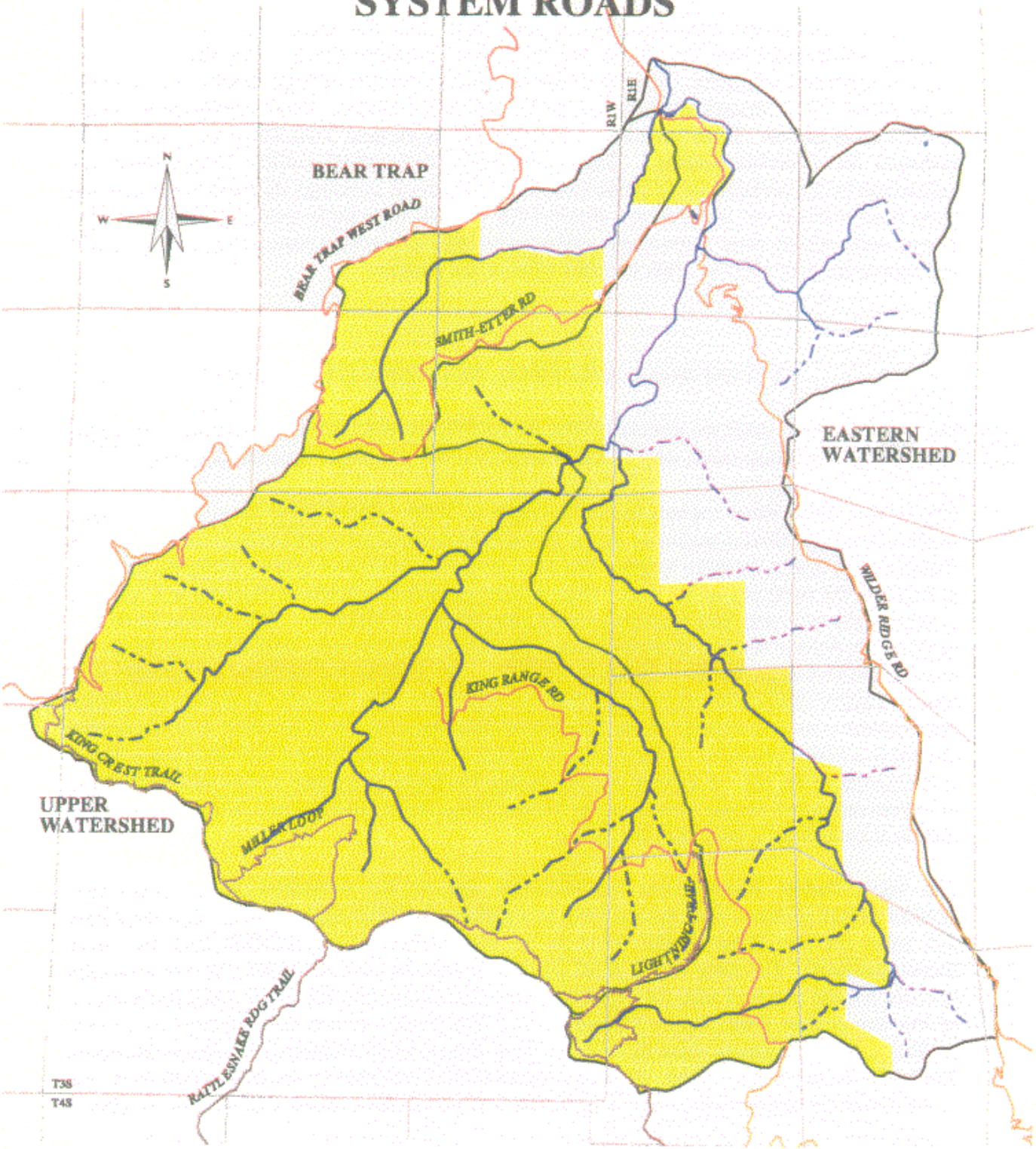
SYSTEM ROAD AND TRAIL NETWORK OVERVIEW

Six major "system" roads are associated with the EASTERN WATERSHED stratum. These are all essentially ridgetop roads which, with exceptions, are not major sediment sources.

The **Wilder Ridge Road** extends the entire length of Wilder Ridge along the eastern boundary of the watershed. Over a period of years, this county-maintained road has been stabilized with chip-seal over nearly its entire length. The only un-hardened section is approximately one mile in length at the north end of the road. Here it drops precipitously down to Honeydew Creek and is apparently too steep and unstable to hold chip-sealing or blacktop. This section of road is problematic from a variety of perspectives. The steep and extremely tight switchbacks do not provide clearance for longer wheelbase vehicles. To provide for passage, a "cut-off" road courses straight downhill through all the major switchbacks. The "cut-off" is mostly unsurfaced and provides a natural drainage channel for runoff from the road. It is assumed that this section of road is a major producer of fine sediment which is delivered directly into Honeydew Creek at the bottom of the hill. It appears that the county has taken every step within economic limits to minimize the deleterious effects of the Wilder Ridge Road, and the un-surfaced section will remain a maintenance issue into the future.

The **King Range Road** enters the southeast end of the watershed as an EASTERN WATERSHED midslope road for 1.6 miles to a midpoint on Bearwallow Ridge. The remaining 3.5 miles of the King Range Road is in the UPPER WATERSHED and has been decommissioned. The King Range Road was constructed in 1964 and 1965. It was originally intended for use as a haul road for expanding timber operations into the upper unlogged portions of the Upper East Fork, Upper Mainstem, and West Fork. It was also intended to provide another north-south access route through the King Range which connected the Horse Mountain Road with the Smith-Etter Road. The road construction terminated in the Upper East Fork due to the extremely steep terrain, unstable land, and a large landslide (known as the "Heart Slide")

MAP 8
HONEYDEW CREEK WATERSHED
SYSTEM ROADS



in the upper mainstem which could not be avoided. The result was an extremely large sidecast/fill, dead end road. The original intent of the road, timber harvest, became moot, with management emphasis shifting toward maintenance of. the intact late-successional forest, preservation of the relatively pristine aquatic habitat, and providing recreation opportunities (USDI . Currently, it is a midslope road of twenty-four to over fifty feet in width which penetrates into the interior of the UPPER WATERSHED, paralleling the Upper East Fork in a mid-slope position throughout its entire length. Analysis of geomorphic mapping has shown that 89% of the road length is drained by inboard ditch, and that 41% of the road length has actively eroding cutbanks that contribute sediment to the ditch in the form of ravel cones, rockfalls, debris avalanches, and other shallow translational slides. At least 29 separate fill failures have been mapped; one paralleling the road for over 750 feet. It delivers sediment to a similar or greater length of stream channel directly below the road (MRC, Twin Parks Co. 1995). In addition to the continual chronic sedimentation resulting from the ravelling of cut slopes into the inboard ditch, the road includes eleven major stream crossings and twenty-four to thirty ditch-relief culverts which have the potential for catastrophic failures of the road prism. These failures have occurred with some regularity resulting in massive sediment inputs into the Upper East Fork and replacement costs exceeding $100,000 to date (MRC 1994). The only function for the road is access to the Lightning Ridge trailhead at Bearwallow Ridge. The terminal 3.5 miles of the road had no ostensible purpose. The road is clearly the largest sediment source for both chronic and episodic sediment inputs into the UPPER WATERSHED, and its removal would secure Honeydew Creek as a refugia for anadromous fish habitat. BLM, working in a cooperative effort with the Mattole Restoration Council, has initiated the complete removal of the King Range Road beyond the Lightning Ridge trailhead. The project is designed to eliminate the road bed wherever reasonably feasible, and to restore natural channel and hillslope runoff networks (MRC, Twin Parks Co. 1995). A foot trail will be established along the length of the decommissioned segment. The project was initiated in August, 1995 with approximately 9,500 feet of road de-commissioned by November of 1995. The remaining road segment was completed in September 1996.

The EASTERN WATERSHED segment of the King Range Road is relatively high in the watershed at this point. The two largest stream crossings drain proportionately smaller tributaries than those north of Bearwallow Ridge. Potential for catastrophic road failures are lower along this section, though inboard ditches are apparent throughout most of its length, and relief culverts are subject to clogging and failure as with any road segment in this type of unstable terrain. A major road failure occurred on this road in December, 1995 in the upper reaches of the adjacent North Fork Bear Creek apparently due to a clogged relief culvert.

Bearwallow Ridge, though not a system road, is a major feature of the watershed and is the boundary between the UPPER WATERSHED and EASTERN WATERSHED. It originates at Kings Peak and proceeds northerly to the King Range Road. This segment contains a foot trail (Lightning Trail) which connects the King Range Road with the King Crest Trail. Continuing north, a fuelbreak follows the Bearwallow ridgeline for approximately two miles (boundary between EASTERN and UPPER strata) to the mainstem of Honeydew Creek. This fuelbreak first appears in the 1966 aerial photo sequence during the same period as logging roads on

Bearwallow Ridge and was apparently used as access to these logging operations. The road has subsequently been reopened as a fuelbreak during wildfires in the UPPER WATERSHED and is likely to be reopened again. The fuelbreak is currently impassible by vehicles. The fuelbreak itself does not appear to be a major source of erosion or sediment but has implications for future management options in the watershed, including both fire management and restoration. (SEE "Plant Communities, Habitats, and Fire")

The **Smith-Etter Road** (See following discussion under UPPER WATERSHED) originates along the mainstem of Honeydew Creek and climbs directly up to the top of Bear Trap Ridge. This section of road crosses the same inherently unstable, deep-seated mass movement area as the "Cow Pie" creek road. First sections of the road as it climbs to the top of Bear Trap Ridge are boggy and easily rutted during wet periods. BLM has applied rock to some sections in an attempt to harden these areas, but generally the problem persists. The road is gated and remains closed to vehicles during the winter season and is maintained annually to minimize resource damage. At the top of Bear Trap Ridge, the road is in good condition, nearly 100% outsloped with no observable rilling or gullying.

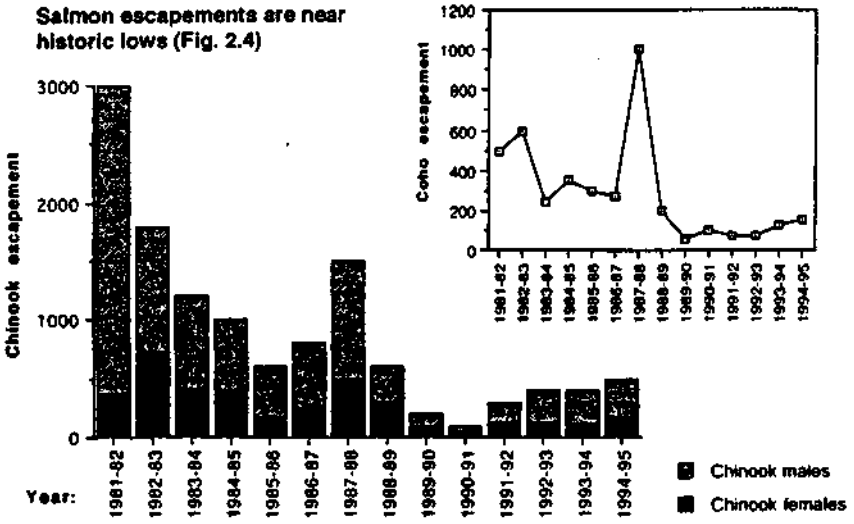
The **Bear Trap West Road** is a ridgetop, watershed boundary road along the northern side of Bear Trap watershed. It exhibits extensive gullying and rilling for almost its entire 2-mile length within BLM lands. The inboard ditch is incising is some areas and failing in others. There are no cross drains and the road is presently in worse hydrologic condition than the majority of abandoned roads.

FISHERIES AND AQUATIC HABITATS

Species Occurrence and Life History Requirements

Fisheries and aquatic habitats are directly affected by geology, erosion, sediment balance, and ultimately by the land use practices occurring in the watershed. Honeydew Creek supports three species of anadromous (sea-run) salmonids including fall-run chinook or king salmon *(Oncorhynchus tshawytscha),* coho or silver salmon *(O. kisutch),* and winter-run steelhead trout *(O. mykiss).* Speckled dace, three-spined stickleback, and rainbow trout compose the non-anadromous fish component. Herpetofauna includes Pacific giant salamanders, rough-skinned

Figure 5
(Reprinted with permission from Dynamics of Recovery, Mattole Restoration Council, 1995.)



Escapement estimates are based on surveys by the Mattole Watershed Salmon Support Group, compiled and analyzed by the group's fisheries biologist Gary Peterson. ('Escapement' is the number of fish that return to spawn.) These data are imprecise, relative estimates, and as such are most useful *for* indicating changes or trends In escapement They point to a decline In salmon runs until 1990. and a gradual Increase thereafter.

newts, tailed frog, southern torrent salamander, and western aquatic garter snake.

Though little quantitative data exist regarding the actual size of Mattole River and Honeydew Creek anadromous fish populations, anecdotal evidence is convincing that runs were large and that these runs have experienced sharp declines over the last four decades (MRC 1995). In the case of the Mattole River, these apparently abundant fish runs have declined to barely viable populations. Though population (or escapement) levels at any point in time are a reflection of a myriad of elements, ocean conditions, harvest, predation, etc., these elements have throughout time operated through a natural range of variability.

Data from the Mattole mirrors data from rivers throughout the Pacific Northwest. Land use

practices severely degraded riverine habitats over a concentrated 30-year period which reached maximum intensity in the 1960s and continued to involve more and more landscape area through the 1980s. The effects of these practices intensified over time as periodic floods flushed concentrated sediment loads into these systems where they were stored in the main stem of coastal rivers. These systems still experience the spiraling effect of these practices. Though subject to the large fluctuations in populations (escapement) due to external conditions, salmonid numbers continued on a downward trend continually reaching new, even lower levels. It is apparent that stocks are not replenishing even under seemingly optimal conditions due to habitat degradation.

To meet the habitat requirements of several life stages of several fish species which live Honeydew Creek simultaneously, an assortment of complex habitats must be available during all ranges of streamflow. Large-scale erosion in the watershed, along with removal of large streamside conifers, contributed to "simplification" of the stream channel and thus reduced habitat quality for native fish species. The impacts of this situation vary among species, life stages, and streamflow. Although little quantitative data exist, it appears that coho salmon and chinook salmon may be more impacted by the changes in habitat condition than steelhead. Both coho salmon and chinook salmon have less flexible early life history strategies than steelhead and thus changes in natal stream habitat are more likely to impact these species.

Data for the herpetofauna of the Mattole system has been gathered in 1994 and 1995 by Redwood Sciences Lab and BLM working with the Mattole Restoration Council. The study is ongoing and employs protocols for detecting species. Emphasis for the study to date is to confirm the presence of species in the system and to determine the role of intermittent streams in their life histories. Forty-eight survey sites have been completed, seven in the Honeydew Creek watershed. Sites were located in the Upper East Fork, West Fork, and Bear Trap. Study data can only be relied upon to document presence of these species until further analysis is completed. Some habitat inferences are described under Habitat Conditions below. Detections are summarized in by subwatershed (Table 4, page 37).

Table 4. Herpetofauna Occurrence

Species	Upper East Fork old-growth habitat perennial stream	West Fork old-growth habitat perennial stream	Bear Trap second-growth habitat perennial stream
Pacific giant salamander	•	•	•
Clouded salamander	+		
California slender salamander	•		
Black salamander	•	•	
Southern torrent salamander	•		
Tailed frog	•		
Yellow-legged frog	•	•	•
Aquatic garter snake		+	•
Western terrestrial garter snake	+	•	
Southern alligator lizard		+	
Sagebrush lizard	+		

• Indicates detection during survey +
Indicates incidental detection

Habitat Conditions

With regard to anadromous fish habitats, Honeydew Creek may be the most intact watershed in the Mattole River basin. The UPPER WATERSHED in particular has not been subjected to the impacts of significant roading, timber harvest, or type conversion. This stratum of the watershed includes the Upper Mainstem, West Fork, and Upper East Fork. Landslide and erosion mapping indicates that these subwatersheds changed little as a result of the 1955 and 1964 floods since the hydrologic conditions are largely intact, i.e. no roads, logging. Herpetofauna occurrence reflects the presence of cooler water and more intact stream condition

in general by the presence of both tailed frogs and southern torrent salamanders in the Upper East Fork.

BEAR TRAP was converted to a grassland habitat through logging and repeated burning and has very high inherent instability. Stream surveys from 1995 note grazing impacts, bank erosion, and high proportion of sand/silt in the streambed. Survey information from 1964 noted that the creek was dry at its confluence with the mainstem, presumably due to a sediment plug in the channel mobilized by the 1955 flood. This subwatershed experienced heavy channel degradation due to the modern-day flood events due to road failures and disruptions in the drainage network, and perhaps experienced much higher peak flows relative to other tributaries due to lack of trees and to soil compaction from heavy grazing use. Bear Trap herpetofauna occurrence indicates a warmer and more exposed aquatic habitat by the presence of aquatic garter snake and yellow-legged frog. Large woody debris recruitment is virtually non-existent in this stratum.

EASTERN WATERSHED has been significantly impacted through logging and subsequent subdivision. Logging of inner gorges effectively removed streamside timber affecting inner gorge stability, stream shading, and large woody debris supply. The Recovery Slide has had a huge impact on a portion of the stream habitat. High Prairie Creek, also in the EASTERN WATERSHED, was heavily logged in the 1960s. Anadromous fish access was limited from 1960 to 1984 near the confluence by an impassable culvert on the Wilder Ridge Road. The flood events of 1955 and 1964 had devastating effects on the inner gorges of subwatersheds in this strata. (See General Surface Conditions. Erosion for complete discussion of land use impacts.) No herpetofauna surveys have been completed in the EASTERN WATERSHED.

The Lower Mainstem (EASTERN WATERSHED stratum) is rather unique in the mid-Mattole basin. The lower four miles of the channel is contained in a broad U-shaped alluvial valley with a gradient of 2% or less. Almost all the other stream channels in the watershed have a gradient of 5-15% or greater. Recent research from the Oregon Cascades and Oregon Coast Range show that flatter reaches of stream such as the lower mainstem tend to be the most productive areas for fish and other aquatic organisms. The steeper reaches tend to transport nutrients which collect in the flat reaches of stream. The Lower Mainstem is also impacted by past grazing, logging, and current subdivisions. Although this may be the most important section of stream from a fish production point of view, it is also the most valuable as usable land for humans and has thus received the brunt of impacts. The 2% gradient reach was likely an important spawning and rearing area for chinook and coho salmon. Spawning habitat for both species is limited to areas of gentle gradient. By all accounts, Honeydew Creek did, at one time, support abundant chinook and coho salmon spawning populations. No herpetofauna surveys have been completed in the Lower Mainstem.

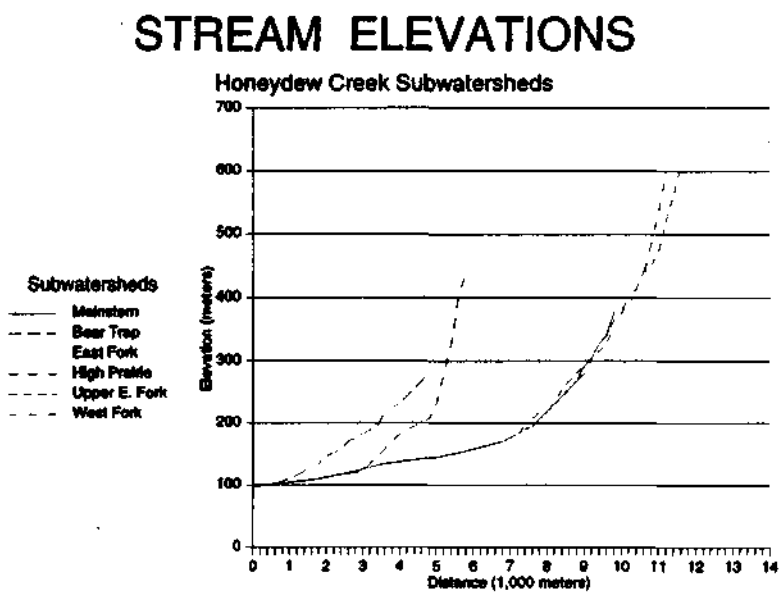
While coho and chinook are predominantly confined to reaches with gradients of less than 2%, steelhead are able to spawn and rear in steeper reaches, perhaps up to 3% or greater. Using this assumption and stream gradient data compiled by BLM in 1995, the following lengths of stream may be suitable for steelhead:

Table 5. Predicted Salmonid Habitat by Stream Gradient

Stream Reach	Length (meters)	Upper Extent of Reach
Mainstem Honeydew	7,800m	To the confluence of Upper East Fork
East Fork	4,600m	To within one mile of KRNCA boundary
Upper East Fork	0m	None except at the confluence
High Prairie Creek	200m	At confluence with East Fork
West Fork	0m	None except at confluence with Honeydew
Bear Trap	1,200m	Marginal habitat
TOTAL	13,800m	

Elements of Recovery (MRC 1989) provides a generalized map of salmonid habitat of the Mattole which closely correlates with stream gradient. The MRC mapping is based on spawning surveys, estimations of upstream limits of use, and "most upstream" observations by surveyors or residents. Figure 6 provides a visualization of stream gradients of the Honeydew Creek subwatersheds. Elevations and distances were plotted from 1:24,000 scale topographic maps. Significant low gradient sections are depicted in the Mainstem and East Fork.

FIGURE 6



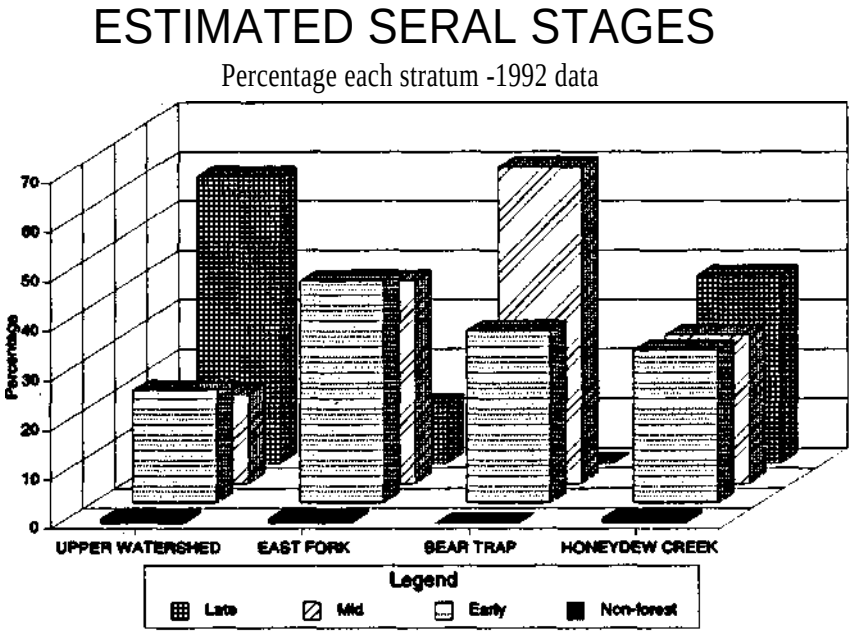
PLANT COMMUNITIES, FIRE, TERRESTRIAL WILDLIFE HABITATS

Vegetation Conditions and Processes

Weather patterns created by the unique combinations of topography and climate in the King Range have created a 150,000 acre zone of mixed evergreen forest along the northwestern California coast. The patch of mixed evergreen in the King Range is isolated from the main body of this forest type which stretches up and down the coast range mountains. The Honeydew watershed constitutes about seven percent of this patch. The King Range influences wind and fog patterns in the Honeydew watershed to the point where the moist redwood forests, so characteristic of coastal areas both north and south of the King Range, are absent.

Prior to European settlement, it is surmised that vegetative assemblages and seral stages of the mixed evergreen forest formed an intricate mosaic that occurred primarily in response to moisture available to plants and to fires of both natural and anthropogenic origin. Large continuous stands of late-seral or old-growth (LSOG) forests that occurred in the Pacific Northwest were thought to be absent from this area (Barbour and Majors 1977).

Figure 7



Processes of the physical environment and interaction of the functioning vegetation tend to support three general structural types in the mixed evergreen forests of Honeydew Creek. The first type is characterized by thick closed canopy Douglas-fir stands with stunted tanoak and madrone as a minor shrub layer that usually occur on deep soils near the cool moist bottoms of slopes where intense fires rarely occur and the fast growing conifers can reach their potential

size. When stand-replacing fires do occur on these sites young conifers can compete aggressively with the hardwoods and can maintain dominance because of the good soil conditions. The second type is made up of giant Douglas-fir occupying an irregular upper canopy with a closed lower canopy of large evergreen broad-leaved species. This type is frequently found on the upper two-thirds of north slopes where moderate or low intensity fires or other disturbances periodically open up the canopy in small patches allowing conifers to grow up through the hardwoods. Low intensity fires in this structural type tend to creep around on the ground and burn up fuels that would otherwise build up to create intense stand-replacing fires. The third structural type of the mixed evergreen forest consists of evergreen broad-leaved woodlands made up of primarily tan oak and madrone. This type generally occurs on forest soils that are somewhat shallow and on sites that tend to be drier such as near ridgetops or on south slopes. Ridgetops tend to get more lightning ignitions. Also, fire ignitions that start farther down slope almost always burn toward the top of the ridge. Fires appear to be frequent enough on these sites to eliminate any conifers before they can grow large enough to survive even moderate fires. Young Douglas-fir are extremely susceptible to fire. The tan oak and madrone sprout after burning and dominate the site, however they rarely become mature trees. These processes have been allowed to develop in those areas of the watershed that have been lightly impacted by man.

In areas of high impact by man, these processes have been amended with a result of a dramatic change in the vegetation communities. Early settlers employed a practice of repeated burning throughout much of the watershed, primarily to enhance sheep forage and maintain existing openings. This practice may not have been substantially different from American Indian burning and served to open understory vegetation and reduce fuel loading. The net effect of such practices may have actually enhanced the LSOG forest.

A change in the tax law profoundly affected land use practices. After 1946, land taxes were applied to the total acreage owned by an individual, regardless of whether the land consisted of forests or grasslands. Thereafter, the value of the standing timber was calculated into the assessed value of the land. Thus standing trees carried a tremendous tax liability. Landowners were suddenly paying a large percentage of their earnings to support their standing timber. Many sold their timber rights to logging operations to reduce this liability (MRC 1995). On many ranches, wholesale conversion of forest to grassland was implemented in this way and subsequently maintained by continued burning. Bear Trap Ridge is a good example of this practice. This watershed was almost entirely LSOG forest through 1948 and now contains no mature forest. 85% of the watershed is in grassland and young brush today. Following acquisition by BLM, many of these sites are currently being planted with Douglas-fir seedlings in an effort to reestablish a forest canopy.

In other areas of the watershed, logging practices alone have amended the natural processes. This is, in particular, the situation with the private and acquired public lands in the EASTERN WATERSHED stratum, along Wilder Ridge and Bearwallow Ridge along the eastern edge of the watershed. Logging practices have created dense stands of young Douglas-fir, hardwoods and brush species. The effect has been to convert the structure type from the second type to the

third structure type. Those stands that have resulted from logging practices are, in general, on more productive sites and have a much higher Douglas-fir component and more active growth rates.

Douglas-fir, tan oak and madrone are the most consistently occurring species in the mixed evergreen with big-leaf maple, canyon live oak and California laurel more or less occurring sparsely throughout the type. Douglas-fir-tan oak-madrone assemblages contain Pacific yew and bigleaf maple in moist drainage bottoms and around side-hill seeps. Sugar pine, chinquapin, and canyon live-oak occur in the mixed evergreen assemblages on drier sites. The Honeydew watershed and the King Range contain a small population of sugar pine that is isolated from the nearest populations by 40 miles (Griffin and Critchfield 1972).

All LSOG forest in the EASTERN WATERSHED and BEAR TRAP strata were eliminated by timber harvest. LSOG forest stands in the Honeydew watershed are only found in the UPPER WATERSHED on cool, moist, north slopes and drainage bottoms. These sites generally grow larger trees with a high percentage of Douglas-fir. Fires are less frequent in these areas, and are usually low to moderate in intensity. The trees also grow faster and taller due to finer-grained and deeper soils.

A few small patches of chaparral shrubland and coastal prairie-scrub steppe occur on sites within the Honeydew watershed where soils are rocky and shallow, and where the aspect is hot and dry (Barbour and Majors 1977). Chaparral areas are vegetated with manzanita, ceanothus, and canyon live-oak. Coastal prairie-scrub steppes contain primarily introduced annual grasses and forbs. Grasses and shrubs from the coastal mixed shrub community occur mixed with the chaparral community or as younger seral stages on sites that could potentially grow mixed-evergreen forest. These seral stages are usually caused by fire and are located on hot dry ridge tops or on recent landslides.

Though intensity and magnitude varied greatly, evidence indicates that fire occurred on a frequent basis in the Honeydew watershed and influenced the vegetative composition and structure. Relatively frequent low intensity ground fires curbed the build up of flammable dead material and probably decreased the incidence of catastrophic fires. Frequent low intensity fires were likely to have killed some trees and created natural gaps in the stands that allowed for development of old-growth characteristics. Fire also probably released other trees with fire resistant bark to achieve larger sizes and become old-growth.

Fire Frequency, Suppression, Management

Fire frequencies in the Coast Range of northern California are low, and stand-replacing fires are rare. Many areas of lowland Douglas-fir and redwood have virtually no fire history. The King Range and vicinity are exceptions along the coastal strand. Offshore flows are a common weather pattern in the King Range, bringing warm dry air from inland sources. As a result, the redwood zone found along the north coast is absent, being replaced by Douglas-fir, tanoak, madrone, brush, and grasslands. Natural fires occur relatively frequently in this regime. Fire is evident throughout Honeydew Creek, and the occurrence, suppression, and management of

fire varies greatly among the three strata of the watershed.

EASTERN WATERSHED

The EASTERN WATERSHED stratum of the watershed contains a high percentage of private land. These lands were logged through the 1960s and 1970s and later homesteaded, particularly along the Wilder Ridge Road. Second growth of tanoak and madrone dominate the landscape, predominately in WHR size class "3" with "dense" canopy closure. There is no modern-day fire history here. No known fires have burned any acreage. Lightning starts are less frequent here due to elevation which is relatively lower than surrounding mountains. Fuel loadings, however, are extremely high and the potential for human-caused fire starts is also extremely high. Drought conditions compounded by late summer offshore flows could produce very high risk of a catastrophic occurrence. CDF fire suppression capabilities exist from both Honeydew and Whitethorn providing short response time to fires in this stratum.

BEAR TRAP

An extensive fire history exists in the BEAR TRAP stratum. This entire subwatershed supported dense stands of late-successional forest historically. The occurrence of natural fire is assumed to be somewhat higher than EASTERN WATERSHED due to higher elevation ridgetops and proximity to the King Crest. Fire management has been extensive starting with a presumption that American Indians frequently used fire to create openings for hunting and manage the landscape for specific foods and materials. After European settlement, it is known that settlers used fire more extensively to create openings for grazing of livestock and to reduce understory vegetation, a practice which persisted into the modern era. As a component of the clearcut logging practices in BEAR TRAP in the 1960s and 1970s, broadcast burning was used to perfect a type conversion to grass on virtually the entire drainage. Following the BLM acquisition of nearly 75% of the stratum, fire has no longer been used to perpetuate type conversion. Starting in 1985, BLM completed successive years of re-planting Douglas-fir. Approximately 227 acres or 28% of the acquired lands have been planted. Currently, fuel loadings remain quite low here with up to 1/3 of the stratum in grassland or replanted fir. Though not susceptible to perpetuating a catastrophic fire, the small fuels would carry fire quickly. Young Douglas-fir on re-planted sites will remain vulnerable to fire loss until the trees attain sufficient growth and bark thickening to develop fire resistance.

UPPER WATERSHED

Fire is an extremely active process in the natural management of seral vegetation in the UPPER WATERSHED. Again, the literature includes references to some level of anthropogenic burning to achieve American Indian objectives, and that this burning probably maintained a more open understory than is evident today. It is unlikely, however, that such burning was practiced in steep, forested areas such as the UPPER WATERSHED. Interviews indicate that use of fire in lower portions of Honeydew Creek watershed after European settlement may have had some effects on the UPPER WATERSHED, primarily from escaped burns at lower elevations. The extent of these burns is largely conjecture. In the last several decades the use of fire as a management tool has declined. The area was never logged. Lightning strikes are very common along the King Crest and, when conditions are conducive, result in frequent natural fires. The

fire return interval is estimated at three to ten years in this stratum. Fires typically start along ridgelines and continue for several days or even weeks. Fire weather is highly variable with burn periods often intensifying at night with offshore wind patterns and dissipating during the day due to fog, marine flow, coastal low clouds, high humidities, etc. These burning conditions result in fires which may "skunk" around as a smoldering ground fire most of the time, taking short runs which may become crown fires as conditions intensify. Fire suppression activities are usually indirect on these fires allowing them to proceed naturally. The resulting vegetative patterns are quite varied and closely resemble the best historic vegetative information available (USDA 1952). Stand sizes, vegetative composition, and distribution of seral stages all indicate that fire continues to function in its natural role in this stratum of the watershed.

Terrestrial Wildlife Habitats

General

Wildlife habitats are determined by the interspersion of plant communities, the structure of plant communities, and the mix of species within a community. Although all the components of habitat are important to certain wildlife species, the habitat preferences of many forest species are related to structure of vegetation rather than plant species making up a community (Thomas et al. 1979). For example, the northern spotted owl usually nests in late successional/old growth (LSOG) and satisfies this preference equally well in mixed evergreen, redwood, mixed conifer, and Douglas-fir communities.

Certain special features such as riparian zones, edges between vegetative types, snags, dead and down woody material, and landslides provide special or unique habitat and may occur in or adjacent to plant communities occurring in the watershed. Many species are dependent on one or more of these special features for part of their life cycle.

The patchiness and age distribution of vegetation strongly influences what wildlife species can occur in an area. The northern spotted owl, the pileated woodpecker, and the Pacific fisher are species that require the features provided by late seral or old-growth forests, such as closed canopy, multiple-layer, open understory, coolness, high humidity, and structural complexity. Some species require large continuous patches of a certain vegetation type, while others may be tied to a specific type or seral stage, but require it in very small amounts (such as certain salamanders that have whole populations in a several acre area). Deer and bear are habitat generalists and can exploit many seral stages of numerous vegetative types. Riparian zones and wet areas are important to many species for water and some less mobile species such as frogs and salamanders carry out their entire life cycles in these areas.

Disturbances such as fire, landslides, and wind-throw encourage tender young sprouting vegetation and the emergence of grasses and forbs which are important to deer, elk, quail, and young grouse. Snags are important to woodpeckers, flycatchers, brown creepers, owls, and bats for food sources and home sites. Dead and down woody materials provide important niches for reptiles, amphibians, and small mammals by providing cool moist homes, hiding places, and sources of food such as insects and mushrooms.

Wildlife species inventories and surveys prior to the influence of Europeans are non-existent. Species occurrence can only be extrapolated from species occurrences documented for vegetative types over a large geographic area. List of hypothetical historic species occurrence have not been compiled, but sources that can be used are contained in Marcot et al 1979, and Anderson et al 1985.

Land Allocations

The entire Honeydew Creek watershed is within the KRNCA which is designated as Late Successional Reserve (LSR) in the Record of Decision for the Northwest Forest Plan. This land allocation conveys a specific set of expectations regarding management of habitats and the populations of animals associated with those habitats.

> "The objective of Late-Successional Reserves is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl" (NWFP ROD 1994).

The ability of an LSR to provide for habitat conditions which attain the objectives outlined in the NWFP provide a focus for analysis of terrestrial habitats in the Honeydew Creek watershed. Over time, the LSOG component of the LSR is expected to increase, providing additional habitat to support viable populations of species dependent upon the structure and other special attributes of this habitat. The importance of this function for LSRs becomes more clear if considered in the context of the surrounding private landscape outside the boundaries of the KRNCA. This private landscape is managed to provide the industrial timber supply for the region and support livestock grazing. It provides very little LSOG habitat for these species. The only significant expectation of increase of LSOG habitat over the larger landscape is within these designated reserves.

Riparian Reserves

Riparian Reserves are land allocations provided in the ROD for the NWFP which overlay all other land allocations. They are designed to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed. Riparian Reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Standards and guidelines prohibit and regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic conservation Strategy objectives.

The ROD prescribed widths to be implemented as "Interim" Riparian Reserves, designed to provide a high level of fish habitat and riparian protection until watershed and site analysis could be completed. Interim widths apply to five categories of streams or waterbodies including:

Fish-bearing streams - The active stream channel plus 300' slope distance either side.

Permanently flowing nonfish-bearing streams - The active stream channel plus 150' slope distance either side.

Constructed ponds and reservoirs, and wetlands greater than 1 acre - The body of water or edge of riparian vegetation and 150' slope distance all sides.

Lakes and natural ponds - The body of water or edge of riparian vegetation and 300' on all sides.

Seasonally flowing or intermittent streams, wetlands less than 1 acre, and unstable and potentially unstable areas - These must include:

* The extent of unstable and potentially unstable areas (including earthflows)
* The stream channel and extend to the top on the inner gorge
* The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation
* Extension from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.

Within the Honeydew Creek watershed, and throughout the King Range National Conservation Area, there is no impetus, such as defined output targets, for defining criteria for minimizing or otherwise altering Riparian Reserve widths. Riparian Reserve mapping is, instead, used as a tool for recognizing and modelling potentially sensitive areas in the course of recreation management, road and trail design and maintenance, restoration project design and implementation, forest stand enhancement, or other projects. To fully define the extent of the Interim Riparian Reserve network in Honeydew Creek, the following mapping was completed: *Stream "crenulation" mapping* - The full extent of the perennial and intermittent stream network was delineated using the method described in FEMAT (Thomas 1993).

Stream buffering - The stream network was categorized as described above and buffered to the prescribed interim reserve widths. *Unstable lands mapping* - Using aerial photography, all unstable and potentially unstable lands were mapped (Granfield Associates 1995).

The three overlays provided a complete depiction of the Interim Riparian Reserve network in the watershed.

The geomorphic feature mapping of unstable, potentially unstable, and lands of questionable stability used the following definitions. "Unstable land" included stream inner gorges, extremely steep terrain, direct evidence of active slope failure, and colluvial deposits from dormant slides. "Potentially unstable land" included areas adjoining unstable lands that are somewhat less steep and show less direct evidence of failure as well as the headscarp and colluvium of dormant slides. Table 6 displays acreage of NWFP stream buffering of the full stream network, and Mapped Interim Riparian Reserve which includes stream buffering and unstable and potentially unstable lands. (Map 9, page 47.) Geomorphic stability is displayed with the road and stream network on Map 3, page 24 entitled Honeydew Creek Stream Crossings.

MAP 9
HONEYDEW CREEK WATERSHED
INTERIM RIPARIAN RESERVES

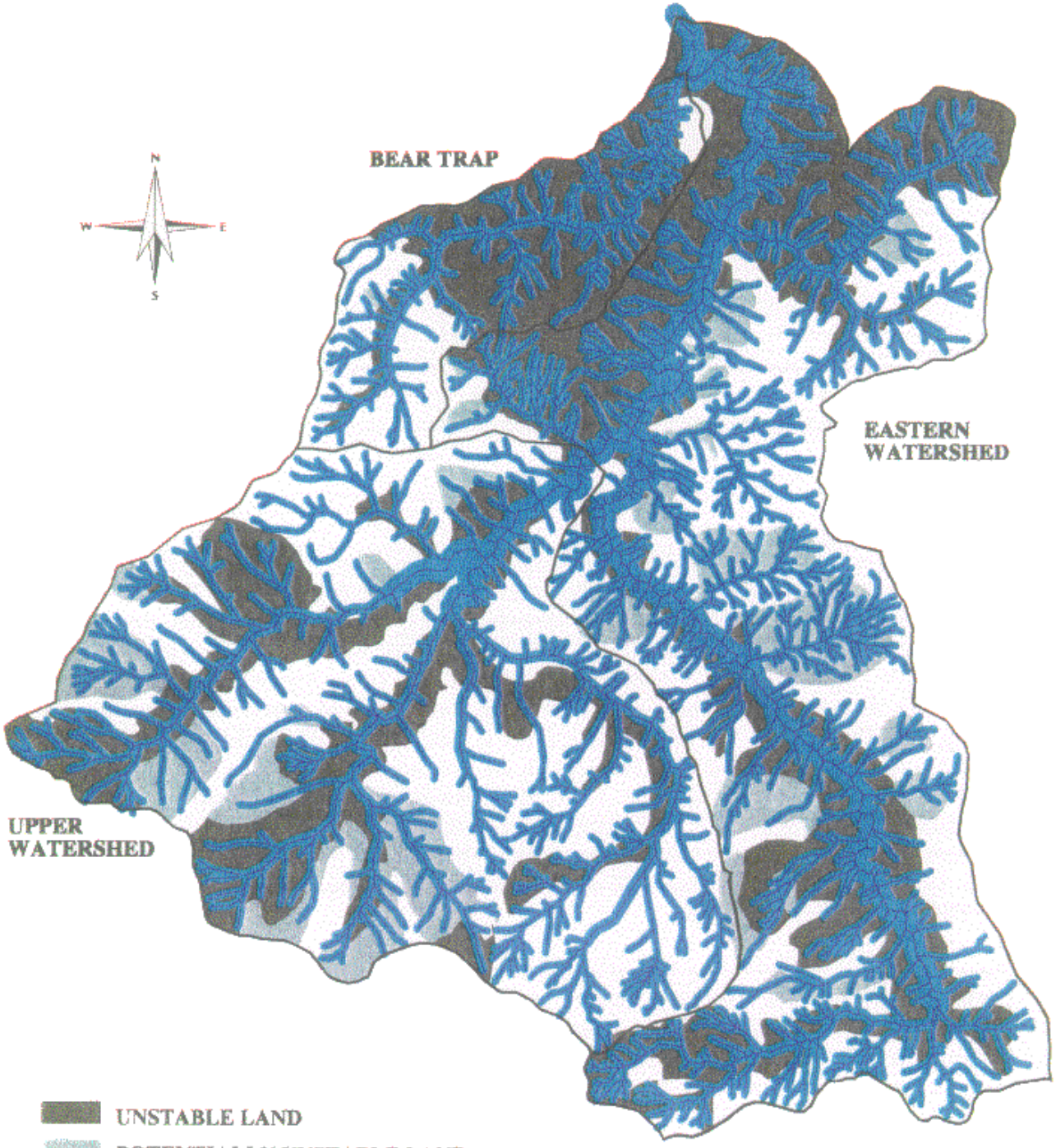


Table 6. HONEYDEW CREEK GEOMORPHIC STABILITY

	BUFFERED STREAM NETWORK		MAPPED INTERIM RIPARIAN RESERVE		UNSTABLE LAND		POTENTIALLY UNSTABLE LAND	
	Acres	% of Stratum	Acres	% of Stratum	Acres	% of Stratum	Acres	% of Stratum
EASTERN WATERSHED	2572.3	47.55	4028.6	74.47	2560.1	47.33	752.7	13.91
BEAR TRAP	454.8	42.35	828.5	77.16	705.0	65.65	5.2	0.48
UPPER WATERSHED	1688.8	37.38	2896.4	64.11	1503.0	33.27	610.0	13.50
WATERSHED TOTALS	4, 715.9	42.87	7. 753.5	70.48	4, 768.1	43.34	1, 367.9	12.43

Habitat Conditions

The vegetation in the Honeydew Creek watershed has been greatly altered over the past fifty years due to changes in two important disturbance factors: fire and logging. The role of fire in vegetative succession has been previously described and is distinct in each of the three strata of the watershed. In the EASTERN WATERSHED, high fuel loadings are the result of complete fire suppression and a preponderance of mid-serai forest regrowth since the logging era. BEAR TRAP has unnaturally low fuel loading due to the type conversions following the logging era. The UPPER WATERSHED appears to function somewhat naturally with respect to the fire regime and represents fuel loads which are suspected to be within a natural range for the site. The intensive logging of the 1950s and 1960s set back the natural succession of the watershed unlike any other disturbance experienced in this basin and was simultaneous with the elimination of LSOG habitats throughout the region. Though very little logging occurred on the public lands of the KRNCA, virtually all of the lands acquired subsequent to the King Range Act of 1970 were previously logged.

These changes greatly altered the habitat available to terrestrial wildlife species dependent upon LSOG conditions. The long-term stability of LSOG forests allowed species to evolve over millennia to take advantage of specific attributes. Adaptability to changing conditions was not an issue for these species. Widespread, abrupt, regional changes in LSOG forest habitat has caused a suite of species, even far-ranging species such as birds, to become at risk of extinction. Although much information necessary for a full analysis of all wildlife species in the Honeydew Creek watershed is lacking, this analysis of available information is focused on northern spotted owls and marbled murrelets.

Analysis of LSOG habitat available for wildlife is characterized using the California Wildlife Habitat Relationships (WHR) system. The system uses a three character identifier which defines vegetation species, size class, and canopy closure (Appendix D). The WHR mapping used here was compiled by BLM personnel using a Timber Production Capability Classification (TPCC) system corrected and refined through aerial photo interpretation and stand inspection in the field. Stand delineation using this system is very accurate as are the WHR classifications in predominately conifer stands. Where multiple canopies of conifer and hardwood intermix, the system is biased toward the conifer classifications and does not provide descriptors for multiple canopies, an attribute which has significant implications for species dependent upon forest structure rather than species. The grouping of size "4" in this system includes tree diameters from 11"-24". It is recognized that a significant amount of suitable habitat may occur within the upper end of this range while the lower end is clearly unsuitable. Despite its limitations, the system provides a usable model of available habitat. Groups of WHR types can be identified to approximate the habitat available to meet specific life history needs of species (Table 8, page 51).

BEAR TRAP Habitat Conditions

As mentioned in previous sections, the BEAR TRAP stratum of the watershed has been subject to type conversion through intensive logging, and by periodic burning to maintain the landscape in grass cover to maximize livestock forage. Current data indicates that no LSOG habitat is available (Figure 8, page 51). The stratum is dominated (64%) by mid-serai, young, dense hardwood stands (H3D), with a minor component (2%) of mid-serai, young Douglas-fir (D3M) which has grown following timber harvest and the exclusion of fire. These sites were historically occupied by LSOG stands and were not replanted following harvest. Tanoak and madrone quickly occupy and dominate these sites. The conifer component is present but unable to out-compete hardwoods. These conifers will remain stunted beneath the hardwood canopy for several decades before contributing to the canopy layer, and then only slowly emerge tree by tree as dominance is gradually achieved. The eventual stand would be expected to have a sparse to open conifer canopy (D, 4-5, S-P) with a dense older hardwood secondary canopy (H4, M-D).

Table 7. Wildlife Habitat Relationships (WHR)[6]
and Seral Stage Estimates
Percentage by Strata - 1992 data

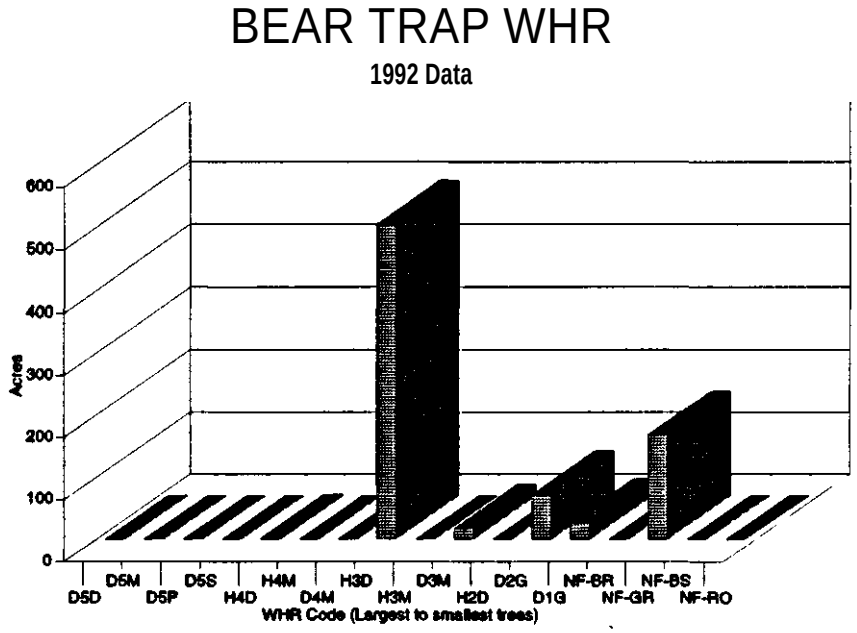
Forest Seral Stage	WHR code	Watershed Strata						Entire Watershed	
		BEAR TRAP (%)		EASTERN WATERSHED (%)		UPPER WATERSHED (%)		HONEYDEW CREEK (%)	
		WHR	Seral	WHR	Seral	WHR	Seral	WHR	Seral
Late	D5D	-	0	-	12	11	58	6	38
	D5M	-		0		23		14	
	D5P	-		0		8		5	
	D5S	-		12		10		9	
	H4D	0		0		3		2	
	H4M	-		0		3		2	
Mid	D4M	-	64	6	41	1	18	2	30
	H3D	64		35		17		28	
	H3M	-		0		0		0	
Early	D3M	2	14	24	34	13	22	15	24
	H2D	-		0		9		5	
	D2G	9		-		-		1	
	D1G	3		10		0		3	
Non-Forest	NF-BR	-	21	7	12	1	2	3	6
	NF-GR	21		4		0		3	
	NF-BS	-		-		1		0	
	NF-RO	-		1		0		0	
Totals		99	99	99	99	100	100	98	98

* See Appendix D for WHR legend.

Table 8. Wildlife Habitat Relationships for Northern Spotted Owl and Marbled Murrelet

Vegetation Species	Habitat Function Nest/Roost/ Forage (N/R/F)	Northern Spotted Owl		Marbled Murrelet	
		Size Class	Canopy Closure	Size Class	Canopy Closure
"D" (Douglas-fir)	N/R/F	5 6	M, D All	5 6	M, D All
D	N/R/F dep	5	S, P[7]		
"H" (Hardwoods)	N/R/F	4 5	M, D M, D		
D	F	4	M, D		
H	F	3	M, D		

Figure 8

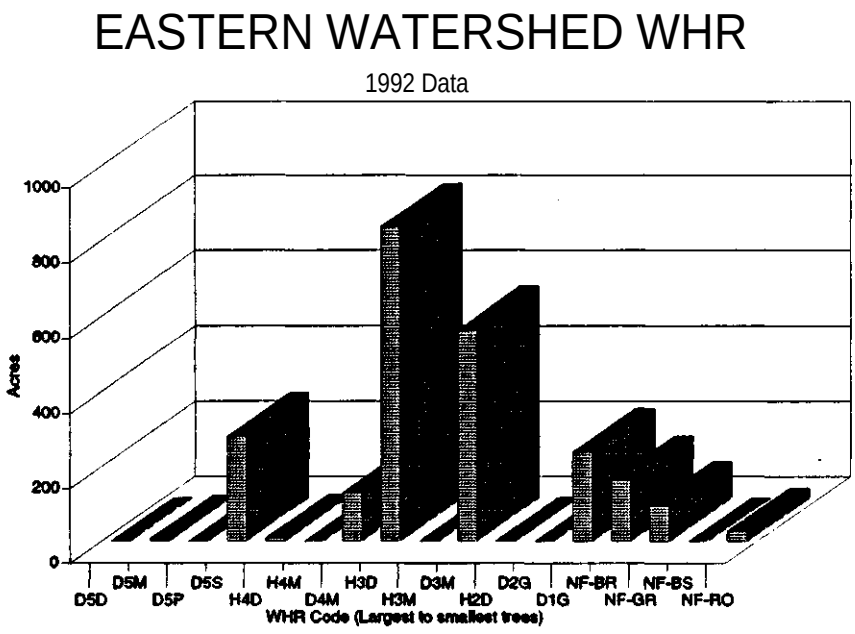


[7] Suitability dependent upon density and size class of hardwood understory in "S" and T" stands.

Significant acreage (227 acres or 29% of the stratum) has been replanted to Douglas-fir. Of this acreage approximately 98 acres (12%) are classified as early seral Douglas-fir stands (D1G, D2G). These sites, under continuing management, will attain structural characteristics conducive to providing LSOG habitat after three to five decades.

Currently no northern spotted owls or marbled murrelets are able to utilize BEAR TRAP. Murrelets have been detected in the Squaw Creek drainage approximately four miles west of BEAR TRAP. There is no suitable habitat available for either species. Historically, this stratum may have supported up to two owl territories.

Figure 9



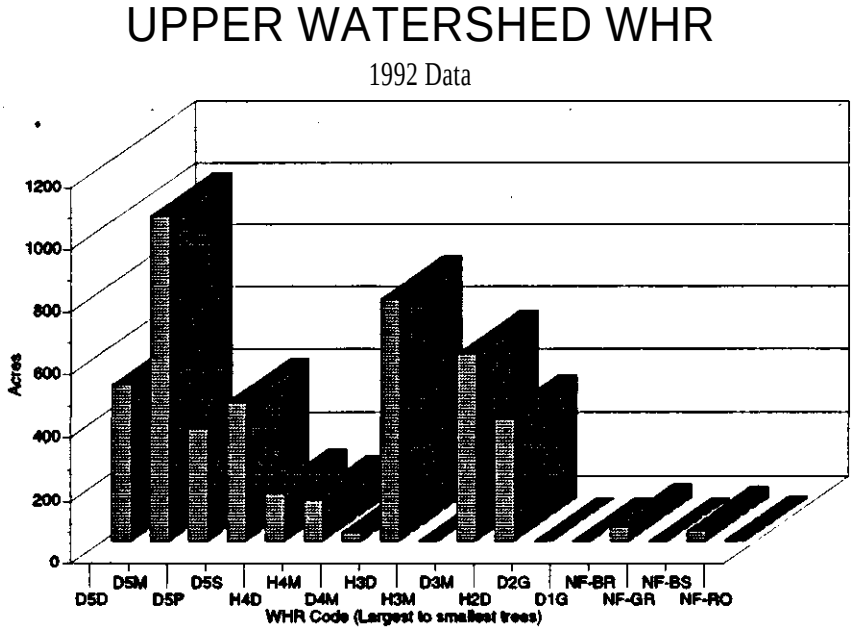
EASTERN WATERSHED Habitat Conditions

Historic information indicates that the EASTERN WATERSHED was subject to a frequent fire regime. There was an interspersion of habitats and good distribution of seral stages similar to the UPPER WATERSHED. The largest continuous LSOG stand in the stratum was in High Prairie Creek. All LSOG was removed from High Prairie Creek and the rest of this stratum was subject to extensive timber harvest activity as previously mentioned with the exception of a sparsely stocked area of Douglas-fir along the east side of lower East Fork. The site was historically an open, late-serai stand. This open stand with a hardwood understory includes 281 acres or 12% of the stratum. EASTERN WATERSHED, as opposed to BEAR TRAP was not continuously treated to maintain a type conversion. Here, the overstory was removed and the site left untreated to regrow into a forest type. Mid-serai stages, three to four decades post-harvest, dominate the stratum in a conifer/hardwood ratio which could potentially provide high

quality habitat for owls and murrelets within three to five decades. Currently, 35% is vegetated by dense, mid-serai hardwoods (H3D) and 24% is composed of mid-serai Douglas-fir (D3M). An additional 10% is in Douglas-fir seedling stock. Much of the mid-serai hardwood acreage lies in the upper 1/3 of the drainage. Available historic information indicates that these sites were always in hardwoods, a product of the short fire intervals associated with the King Crest. Much of the mid-serai and seedling Douglas-fir occurs in the lower 1/3 of the drainage where historically LSOG was maintained. These appear to be prime areas for the recruitment of LSOG stands.

Northern spotted owls have been detected along Bearwallow Ridge in the last two years. Each detection was a single male owl which could not be "moused" and attached to an existing activity center. Surveyors speculate that the owl may have been called in from an adjacent territory in the UPPER WATERSHED or may be a young owl, perhaps dispersed from a nearby territory, which frequents this habitat due to the abundant prey base associated with the mid-serai brush and hardwood communities. Historically, the stratum may have supported up to four pairs of owls. Large LSOG stands with extensive interior forest habitat occurred in High Prairie Creek, at the confluence of the East Fork and main stem, and throughout the length of the East Fork to its headwaters. No marbled murrelet habitat occurs in the stratum.

Figure 10



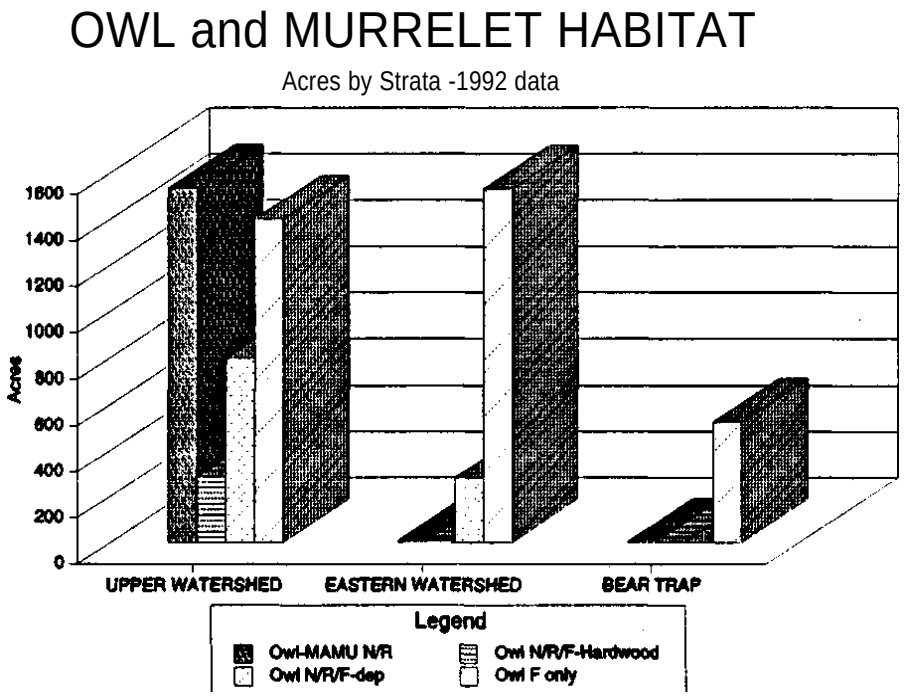
UPPER WATERSHED Habitat Conditions

Seral stage distribution in the UPPER WATERSHED is a product of an apparently natural fire regime in this habitat and location. All but seven acres of mapped "D5D, D5M, and D5P within

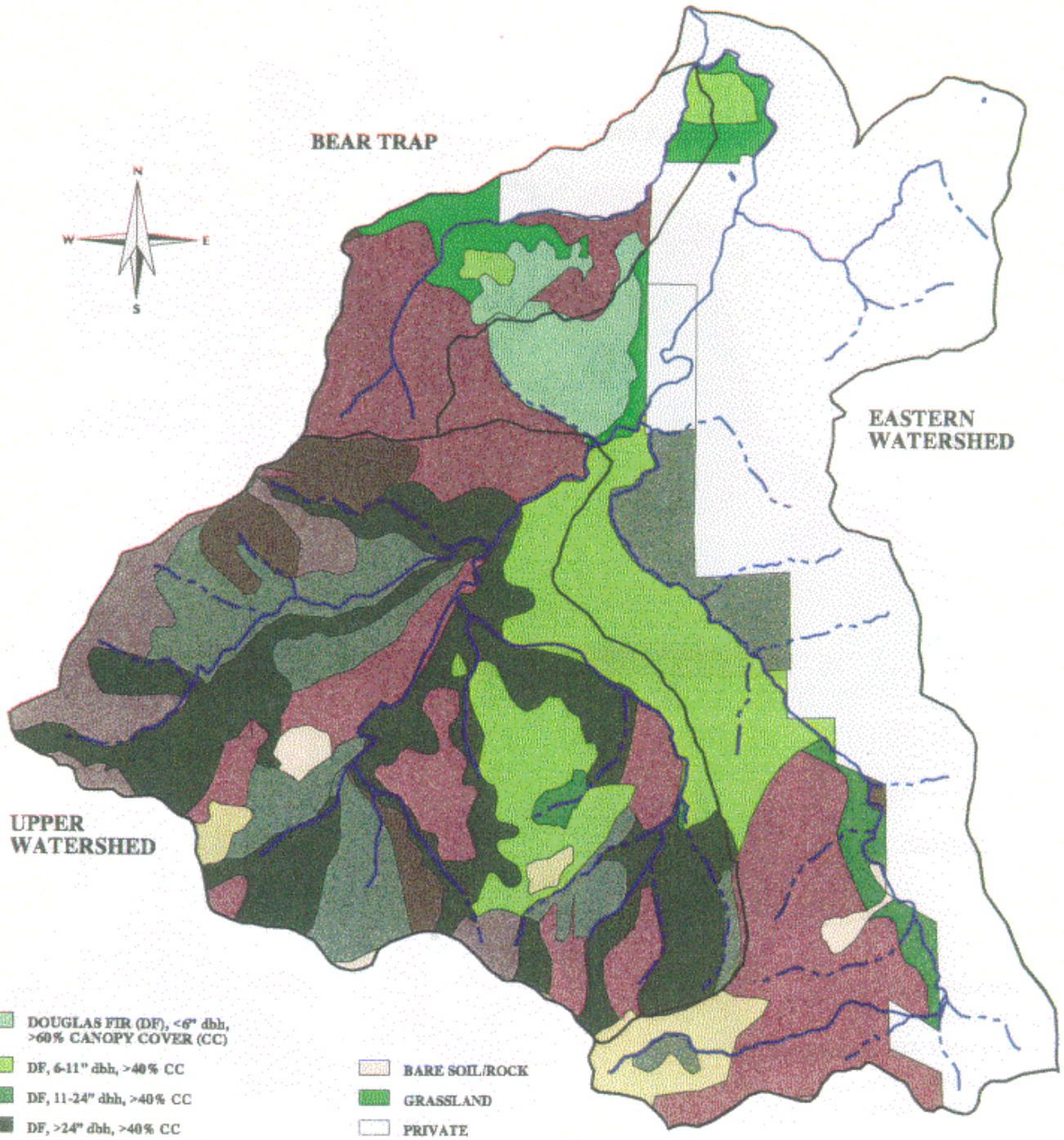
the Honeydew Creek watershed occurs in this stratum. 89% of all size class "5" stands and 70% of all size class "4" stands occur here. Most LSOG habitat is concentrated along drainages in the lower half of the stratum where cool, moist conditions extend the growing season and reduce fire intensities. Higher in the watershed, stands represent a greater diversity in seral stages. The effects of fires of varying intensities are evident. Some ground fires in established LSOG stands have served to reduce understory vegetation. Other stands have been affected by crown fires which remove much of the canopy layer. Areas along ridgetops are subject to the most frequent fire intervals and are often maintained in brush or young hardwood stands. Accounts by residents of recent fire activity (1990) describe ridgetop fires which lasted up to two weeks. Some stated that these never became crown fires and appeared to "drip" down the slopes. No direct suppression was applied to the fires. They remained high in the watershed and eventually were extinguished by rains. Historic vegetation information on the stratum is consistent with the current vegetation in stand size, number, and distribution.

Northern spotted owls were detected at three activity centers in the UPPER WATERSHED in 1980 and 1981. Current monitoring has confirmed owl activity at two of these sites (1992 and 1994). No owls have been confirmed at the third site though access for monitoring is good. No marbled murrelets have been detected through two years of surveys at four groups of stations along the King Range Road and King Crest. The 25 stations visited for the 2-year protocol covered approximately 750 acres of murrelet habitat. Another four stations covered 120 acres in 1996 for one-half of the 2-year protocol.

Figure 11

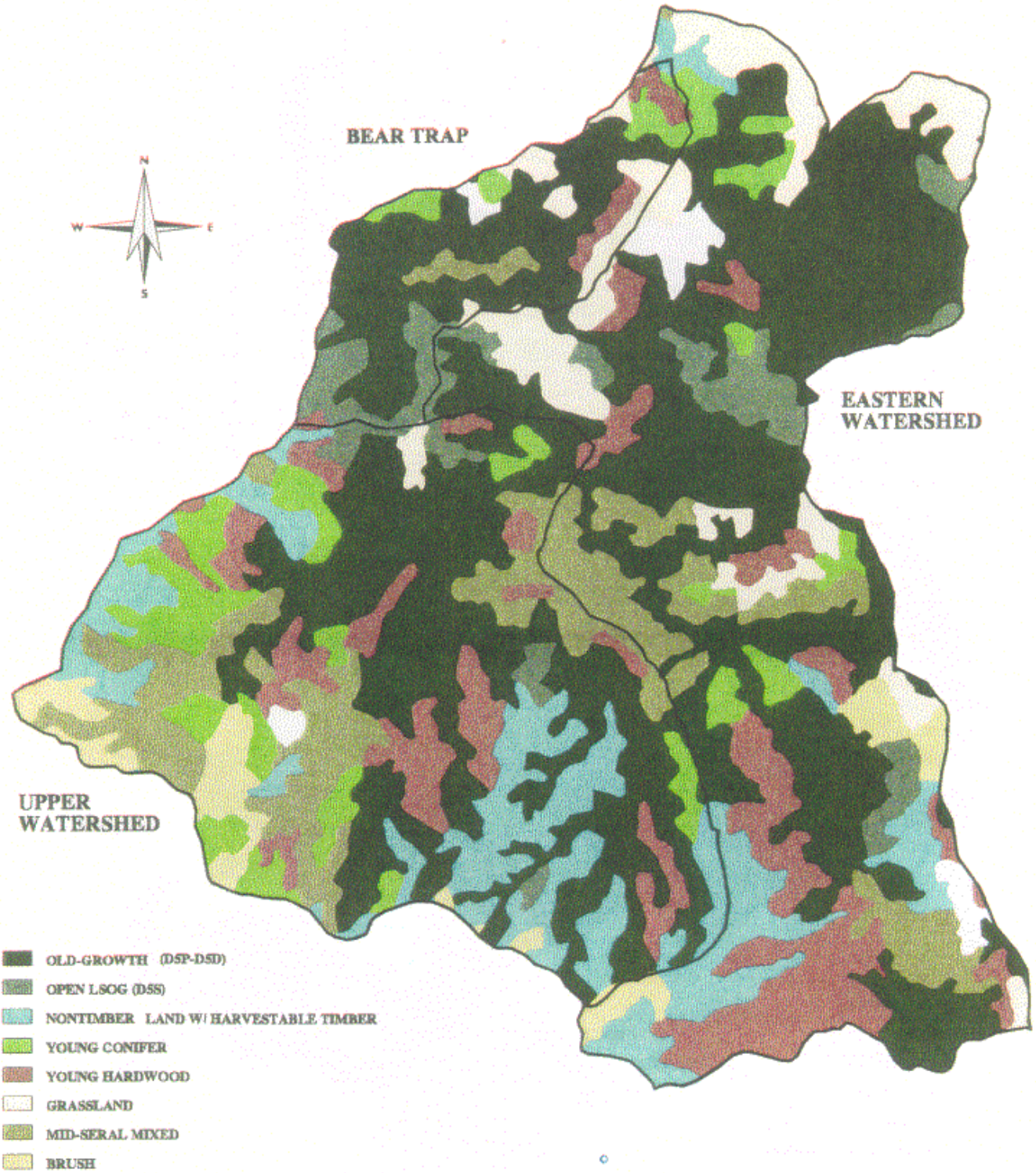


MAP 10
HONEYDEW CREEK WATERSHED
1996 WHR VEGETATION TYPES



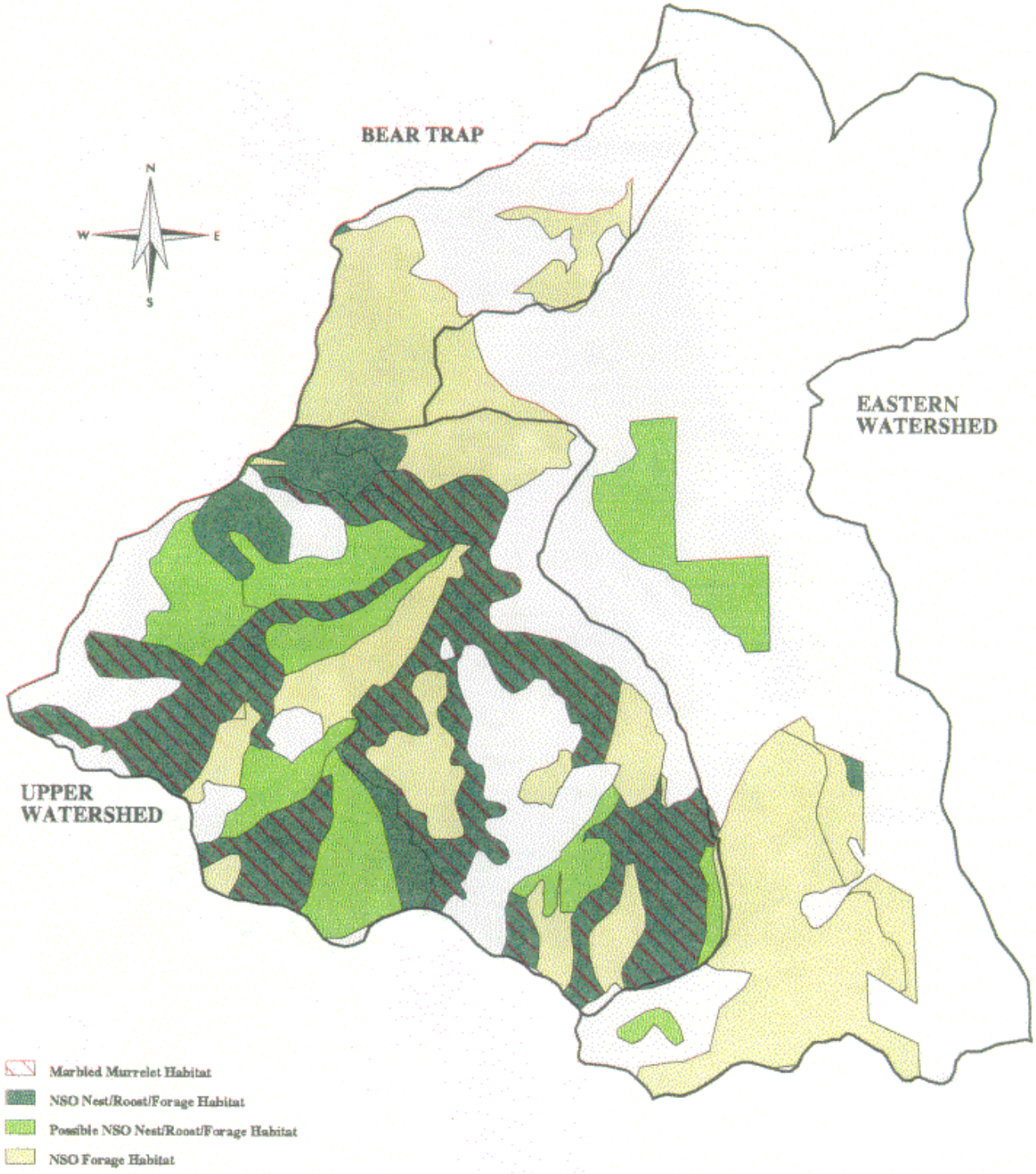
Scale 1:48000

MAP 11
HONEYDEW CREEK WATERSHED
1948 VEGETATION TYPES



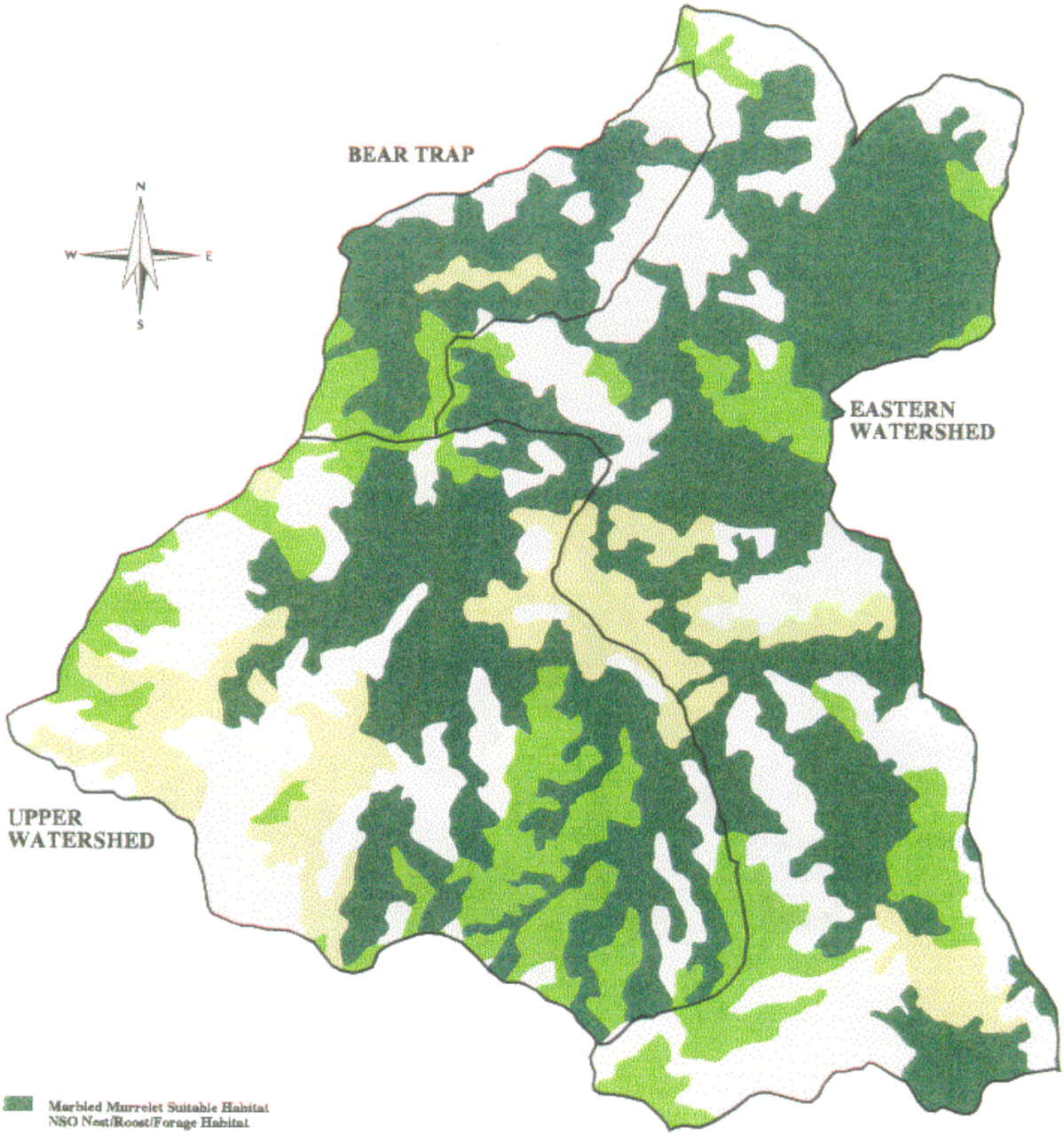
Scale 1:48000

MAP 12
HONEYDEW CREEK WATERSHED
MARBLED MURRELET & NORTHERN SPOTTED OWL SUITABLE HABITAT (1996)



Scale 1:48000

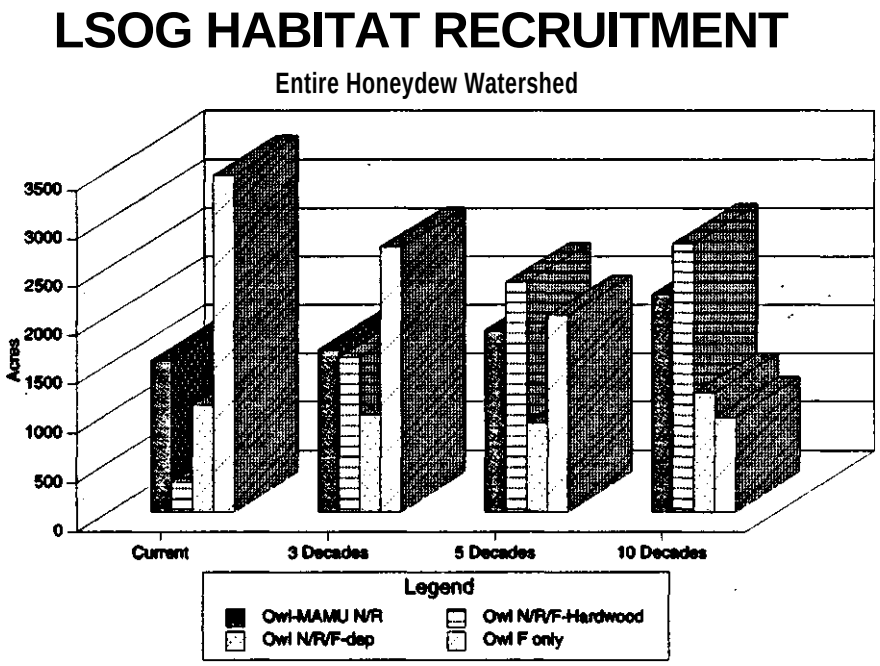
MAP 13
HONEYDEW CREEK WATERSHED
MARBLED MURRELET & NORTHERN SPOTTED OWL SUITABLE HABITAT (1948)



LSOG Recruitment

Currently there is no capability in the Arcata Resource Area for modelling of forest stands through time to predict habitat quantities. Such modelling may become available as new vegetation mapping is developed in 1997. Staff foresters and biologists looked at the watershed stand by stand and made judgements, using their familiarity with the stands and the ecological processes affecting seral stage development. Making assumptions about where habitat developed historically in the watershed and tempering those assumptions with the effects of land use practices on the development of future stands, the staff developed rough habitat estimates using the owl/MAMU habitat WHR groupings. For the entire analysis area, the estimates are depicted in Figure 12. Most notable are the relatively minor increases predicted in D5 and D6 size classes with M and D canopy closure (Owl-MAMU N/R) from approximately 1, 500 acres to 2, 200 acres in the next 10 decades, and the large increases in mature hardwood (Owl N/R/F-Hardwood) from approximately 300 acres to 2, 700 acres. By watershed strata, these changes are detailed below.

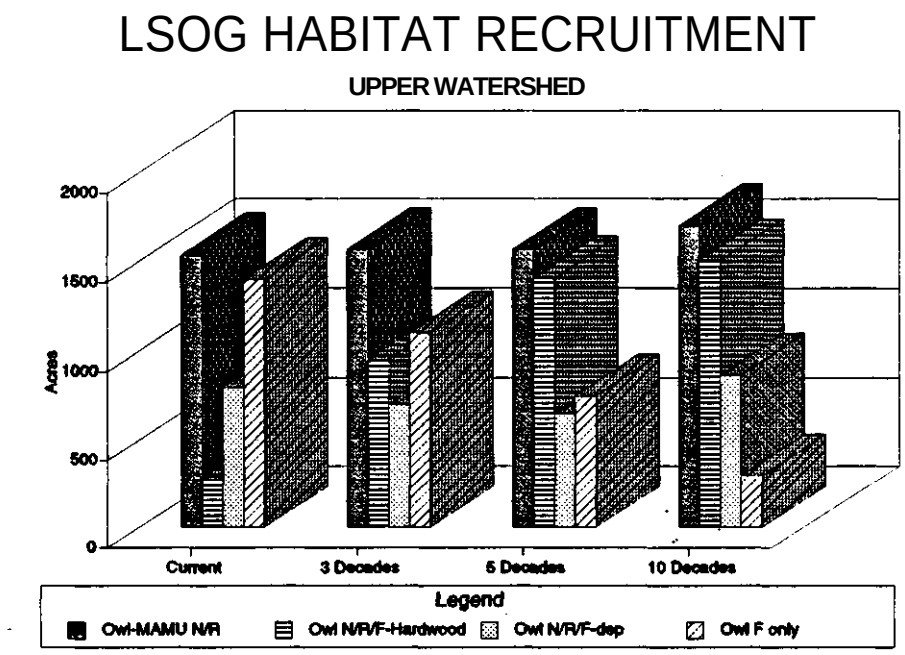
Figure 12



As previously discussed, the UPPER WATERSHED stratum is relatively unaffected by previous land uses. Ecological processes, such as fire, have been allowed to continue. LSOG habitat occurs mainly on the lower one-third of slopes and in drainage bottoms. Comparisons with 1948 vegetation mapping shows a very similar configuration of these habitat patches in size, number, and distribution. As depicted in Figure 13, LSOG habitat (Owl-MAMU N/R, Owl N/R/F-dep) remains relatively stable decade by decade. One relatively large D3M stand above the King

Range Road is apparently the product of an escaped controlled burn in the early 1900s. Much of the eventual recruitment of LSOG habitat is attributable to ingrowth in this stand and harvested stands along Bearwallow Ridge. Another trend which is expected is the maturation of hardwood stands, especially in lower elevation harvested stands. A large percentage of H3D and H3M (Owl F Only) will mature into H4M and H4D (Owl N/R/F-hardwoods) stands, assuming a natural fire regime is maintained. Ridgetop areas of hardwoods will remain in roughly the same age classes through time as frequent fires offset ingrowth.

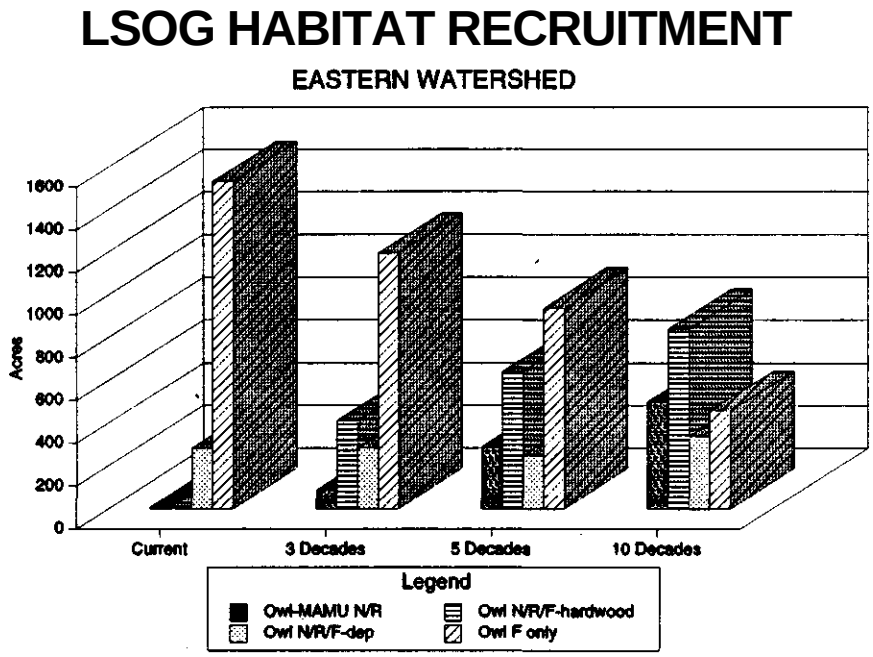
Figure 13



The entire EASTERN WATERSHED stratum was logged in the late 1950s and early 1960s. With the exception of a small area of open D5S and D5P (Owl N/R/F-dep), no LSOG habitat is available currently (Figure 14). There are significant stands of D3M and H3D (Owl F only), of which much of the D3M is on the lower one-third of slopes and in the East Fork drainage bottom. There is potential for recruitment of approximately 500 acres of LSOG conifer habitat particularly after the third decade as the D3M matures into size class 5. LSOG recruitment during the first three decades is dependent upon ingrowth in a 130-acre stand of D4M in the upper end of the East Fork drainage bottom. Again, as in the UPPER WATERSHED, the maturation of extensive hardwood stands on previously harvested sites is the source for LSOG habitat recruitment. Lower seral stage hardwood stands will be maintained in some configuration along ridgetops where fire continues to play a natural role. However, the EASTERN WATERSHED is subject to intensive fire suppression to protect private property along Wilder Ridge. In the absence of a catastrophic fire, hardwoods may be maintained in

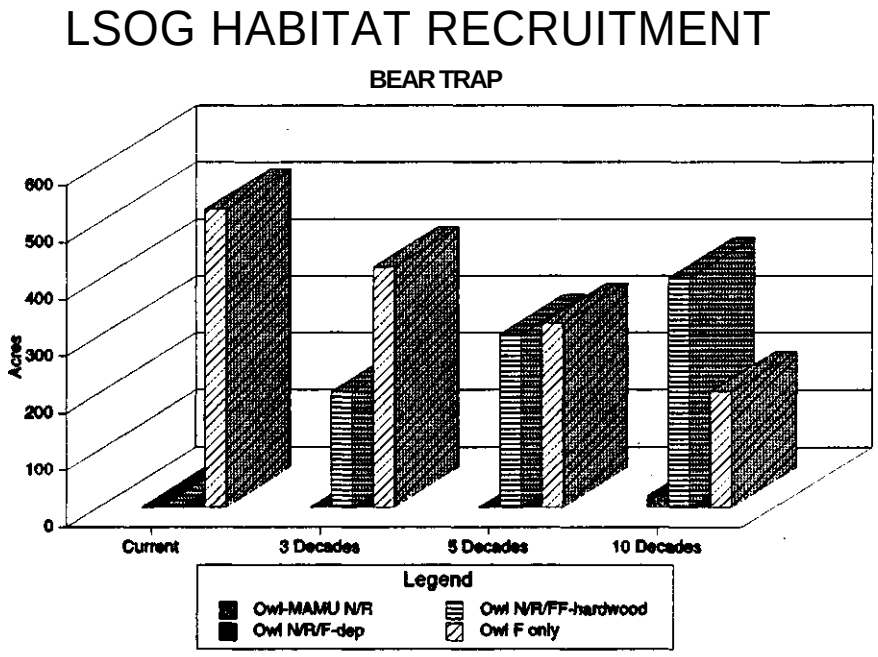
larger size classes through time due to these suppression activities.

Figure 14



The BEAR TRAP stratum currently contains no LSOG habitat. As previously described, the entire watershed was clearcut, burned, and maintained as grassland for livestock grazing. There are currently no stands in size classes greater than eleven inches in diameter. Extensive areas have been replanted in Douglas-fir and are growing at rapid rates; however, no appreciable conifer LSOG habitat recruitment will occur for many decades in this stratum. As with the other strata in Honeydew Creek, the maturation of young hardwood stands will provide the most significant habitat recruitment. H3M and H3D stands (Owl F only) will advance into H4M and H4D (Owl N/R/F-hardwood).

Figure 15



Owl Habitat Analysis

Currently, three owl territories are located within the Honeydew Creek watershed. All three are within the UPPER WATERSHED stratum in the bottom of drainages where LSOG forest is dominant. An analysis of the home range radii for these owls is shown in Table 9, page 63. The USFWS "take" guidelines consider home ranges (1. 3 mile radius around the territory center) which have less than 1336 acres (40%) in nesting/roosting habitat (or less than 500 acres (50%) within a 0. 7 mile radius) to be below the "take" threshold. This would be an indication that these territories are below the established biological standard in terms of amount of habitat available. Such estimates are highly subjective but serve as a consistent standard.

Territory #HU 011 contains 1, 151 acres of Nesting/Roosting habitat and another 712 acres of Nesting/Roosting-dependent habitat (footnote 7, page 51) in the home range and 353 acres N/R and 317 acres N/R-dep. within the 0. 7 mile radius. The territory contains very nearly the acreage necessary to be above the "take" threshold. Assuming that a subset of the Nesting/Roosting-dependent acreage is likely to provide viable habitat, the territory would be above the standard. This territory is within the most pristine areas of the UPPER WATERSHED. Land use practices have not altered this portion of the landscape and natural fire is the dominant force controlling seral stage. Recruitment of additional LSOG habitat is not expected to be significant in this territory. A pair of owls was detected in the territory in 1992. On June 21, 1995, a pair of barred owls was detected in the northern portion of the territory.

These owls were not detected in 1996 but could remain in the territory. They potentially represent significant risk to northern spotted owls in the watershed.

Territory #HU148 contains only 456 acres of nesting/roosting habitat within the home range circle and another 292 acres of nesting/roosting dependent habitat. 82% (374 ac.) of N/R habitat occurs within the 0. 7 mile radius with 107 acres of N/R-dep. habitat. The territory is deficient in habitat with respect to the "take" standard. Though the nest site which defines the territory center is located within the UPPER WATERSHED, the 1. 3-mile home range circle includes large areas in the EASTERN WATERSHED and BEAR TRAP where land use practices have significantly reduced available nesting/roosting habitat. Large acreage of D3M stands occur along Bearwallow Ridge. These stands are expected to grow into viable owl habitat within the next three to five decades, potentially increasing the available habitat within the take circle by 250 to 500 acres, dependent upon losses by wildfire during the period. The BEAR TRAP portion of the home range was subject to type conversion. Habitat recruitment in this area is five to ten decades into the future. A pair of owls was detected in the territory in 1994.

Table 9. Owl Territory "Take" Analysis

Territory #	Nesting/Roosting (acres)		Nesting/Roosting-Dependent (acres)		Foraging Only (acres)	
	1.3 mi radius	0.7 mi radius	1.3 mi radius	0.7 mi radius	1.3 mi radius	0.7 mi radius
HU 011	1151	353	713	317	404	126
HU 148	456	374	293	107	1440	186
HU 347	919	328	562	290	598	214

Territory #HU347 is also located within the UPPER WATERSHED less than one-half mile from #HU148. No owls have been detected at this site since 1981 though single owls called in the Bearwallow Ridge area may have been pulled up from this territory. The "take" circle includes 918 acres of nesting/roosting habitat and an additional 561 acres of nesting/roosting-dependent habitat. Within the 0. 7 mile radius the territory contains 328 acres of N/R habitat and 290 acres of N/R-dep. habitat. Available habitat is at or near the "take" threshold and is likely to improve by up to 500 acres in the next three to five decades as ingrowth occurs in D3M stands along Bearwallow Ridge and in the UPPER WATERSHED.

There appears to be very little opportunity to establish additional owl territories as ingrowth occurs into the future. The current owl territories include nearly all of the available public land habitat and there is no expectation that adjacent private lands will make an appreciable contribution of habitat in the future. The only potential opportunity may be in the EASTERN WATERSHED stratum. Here, 130 acres of D4M stands along the East Fork are flanked by 600 acres of H3D, 500 acres of D3M, and some remnant D5S stands (280 acres) in the lower third of the slopes. This configuration of habitat may be conducive to establishment of an

additional territory though the potential core area is split by the 27-acre Recovery Slide. Single male owls have been detected in this area in 1992 and 1993.

Connectivity Issues

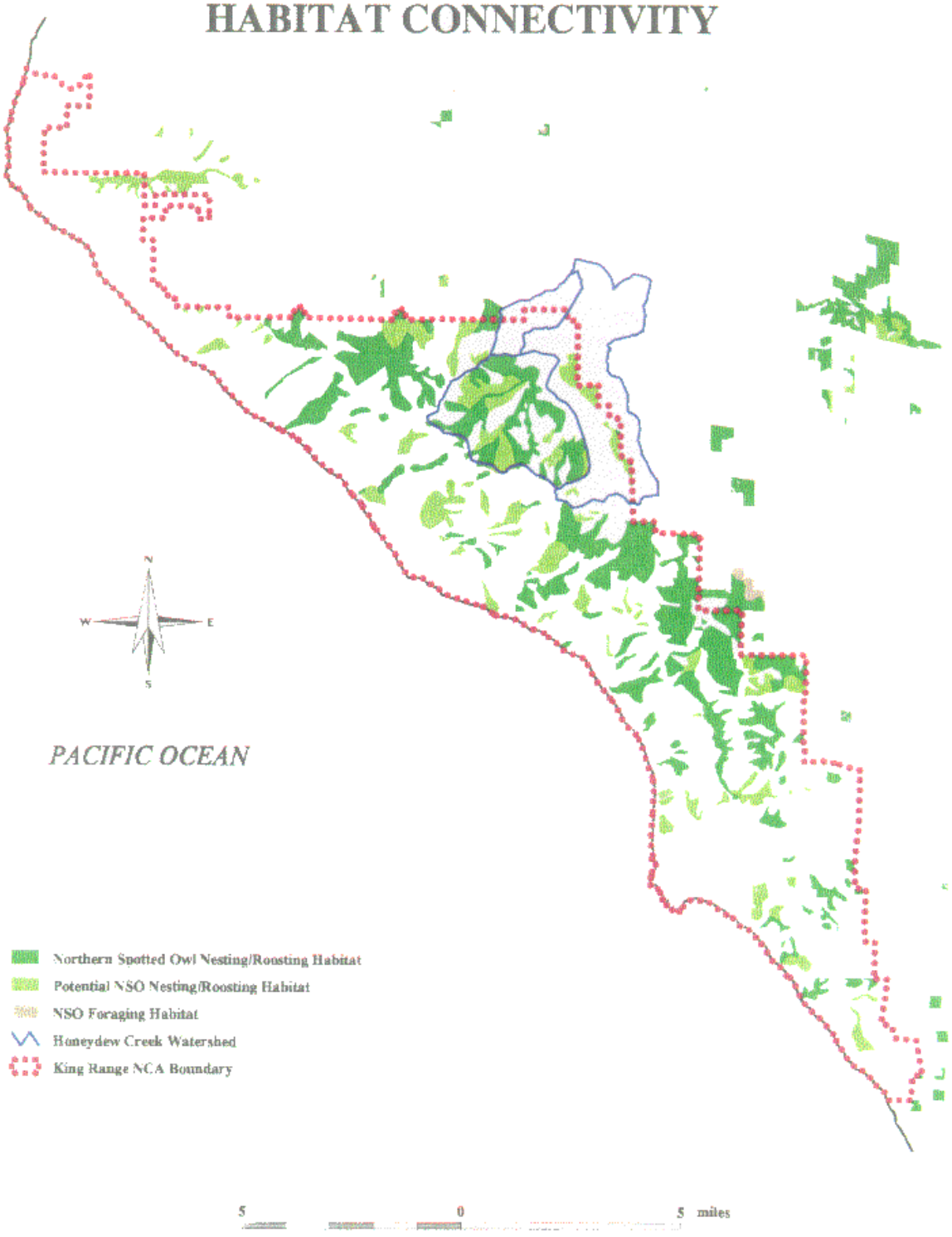
Connectivity is generally defined in the context of this document and the Northwest Forest Plan as forest stand conditions conducive to theoretical movement of dispersing northern spotted owls between neighboring population centers. The issue quickly expands beyond the boundaries of individual watersheds to much larger landscapes such as the river basins and whole provinces. Currently there is no vegetation database available in northern California which provides consistent information for completing such an analysis and conditions can only be inferred from aerial photos and local knowledge. A WHR database was developed at the request of the Timberland Task Force (TTF) which covers the entire region. This database has been extensively scrutinized by the GIS community and has been found to include error rates which are beyond an acceptable level for analyzing forest habitats. Eventually, BLM intends to look across the entire coastal province to identify dispersal and LSR issues using a seamless vegetation layer. Such an analysis remains a data gap at this time.

On a smaller scale, within the KRNCA, dispersal conditions for northern spotted owls as depicted by analysis of the "50-11-40"[8] condition reveals a preponderance of deficit townships. Only two of 24 quarter townships meet the 50% threshold for the 11-40 condition. Two distinct sets of data are revealed. The King Range east slope, as a whole, has 37% of the landscape in 11-40, whereas the west slope meets this condition on only 11%. In spite of the apparent deficiencies, it is suspected that owls are able to disperse throughout the east slope. LSOG forest is relatively continuous along major drainages and many areas of re-growth have a developed young hardwood canopy which should support dispersal. The west slope is an intensely erosive substrate with a high fire frequency and preponderance of natural grasslands. It is suspected to not provide for connectivity from north to south.

Looking beyond the KRNCA boundary is an intuitive exercise in the absence of consistent habitat data. To the north, in the North Fork of the Mattole, natural grasslands and heavily harvested forestlands provide little for connectivity to the next available suitable habitat. Beyond the North Fork, the Eel River bottoms provide an abrupt barrier to northward movement. To the south, natural fragmentation along the coast would interrupt interaction with any populations in coastal Mendocino county. Further inland, the headwaters of the Mattole provide a jumping off point into the southern redwood zone. These lands are intensively managed industrial forestlands. Data from private companies indicate a surprisingly high number of owl territories primarily associated with remnant stands in coastal drainages. Some continuity of habitat may be available with these populations. To the quadrants ranging from northeast to southeast, habitat patches may provide enough habitat continuity to provide for interacting populations through the adjacent state parks, BLM lands at Gilham Butte and Red Mountain, stands

8 "50-11-40" - A dispersal habitat standard for northern spotted owls in which 50% of the landscape is covered with stands of trees averaging 11 inches in diameter at breast height, and with at least 40% canopy closure in the overstory layer. The standard is analyzed across the landscape per each quarter township (Thomas et al 1990).

MAP 14
HONEYDEW CREEK WATERSHED
HABITAT CONNECTIVITY



associated with the "Headwaters Forest", and other remnants of mature forest structure on the landscape. Toward the northeast, the lowland Douglas-fir intergrades and eventually gives way to the redwood 7, one and relatively high owl populations and habitat suitability. Toward the southeast, warmer and drier conditions result in higher natural fragmentation and less suitable habitat.

In summary, owls within the KRNCA are likely to interact with outside populations, primarily those to the east. Though the KRNCA LSR provides a suitable habitat patch along the coastline, connectivity to other populations is probably non-existent to the north and south, though some connection may be operative slightly inland toward the southeast.

This analysis recognizes that dispersal needs of other organisms are not adequately addressed due to lack of information.

Other Species and Their Habitats

The bald eagle and the American peregrine falcon are federally listed as endangered species and have been observed in the watershed. Winter sightings of bald eagles are relatively common. Anecdotal accounts of nesting season bald eagles are ambiguous but indicate some potential for nesting. Several accounts are noted from near the mouth of High Prairie Creek. Western pond turtle and Pacific fisher are species of concern, have been observed in the Mattole, and would be expected in the Honeydew Creek watershed. No inventory has been done. Other species of concern known or suspected are red tree vole *(P. pomo),* goshawk, and pileated woodpecker.

Deer are able to utilize early seral habitats. These habitats were in abundance during the logging era. Many residents remark that deer populations seem to be declining. Such a decline is expected as previously logged areas advance successionally into tall shrub, pole, or young saw timber stages. Deer populations have steadily decreased from the peak numbers of the 1970s.

Survey and Manage Species from the NWFP Record of Decision

BLM contracted with Humboldt State University mycologist Dr. David Largent to complete surveys for non-vascular plants within the King Range National Conservation Area in 1994 and 1995. The study was designed to establish plots in representative habitats to census and characterize habitats for bryophytes, lichen, and fungi of Honeydew, Bear, and South Fork Bear Creek watersheds. Results of the study are attached in Appendix B. Seven ROD-listed species were identified, four species requiring ROD protection as outlined in strategy 4, and 3 species requiring the protections outlined in strategies 1 and 3 (ROD table C-3). One species, *Choriomyces venosus,* is a rare truffle (strategy 1) requiring a 160-acre buffer. As stated in the ROD, "areas of 160 acres should be temporarily withdrawn from ground-disturbing activities around known sites until they can be thoroughly surveyed and site-specific measures prescribed". Dr. Largent has determined that growing conditions were not conducive to growth of many fungi species and that these are under-represented in the sampling of 1994 and 1995. Sites will be revisited in 1996 and 1997. Appendix B will require updating at that time.

HUMAN USES

Prevalent human uses in the watershed have changed over time and have depended upon resource utilization and availability and ownership. The three strata of the watershed have each supported different types and sequences of uses.

UPPER WATERSHED

Current human use in the UPPER WATERSHED is focused on primitive recreation. The stratum is 100% public land has always been predominantly in the public domain. BLM maintains a road and trail system which provides access to primitive recreation opportunities. Most use is by hikers who access the King Crest Trail and King Peak, by day hikers, tourists and locals who explore the system road network by automobile, and to some degree by sectors of the public who harvest special forest products for personal or cultural use such as mushrooms, bear grass, salal, and other wild foods or materials. The deer hunting season brings an influx of visitors to the King Range. The Honeydew Creek watershed, due to the dense vegetation, is less desireable for its deer hunting opportunities than other areas of the King Range.

Historically (post-European), the understory of this stratum may have been kept more open through the use of fire and supported some degree of sheep grazing. Home ranches were located near the mouth of Honeydew Creek and in Bear Trap Creek. The extreme slopes and inherent instability of the stratum limited logging opportunities. Logging only occurred as previously described, along Bear Trap ridge and Bearwallow Ridge. The King Range Road was intended to open the UPPER WATERSHED to logging, but construction was aborted due to the steepness and instability. No further logging occurred and the road is being removed.

EASTERN WATERSHED

This stratum supports a wider variety of human uses due to ownership patterns and county road access. Current social factors that affect ecological processes in the watershed include the rising population in that segment of the watershed which is not owned by BLM, the attitude of private land owners towards land management in general, and the way in which owners manage and use the land in their possession. In a 57 square mile sample area researched by Anders (1995) which included the entire EASTERN WATERSHED, she differentiates between two distinct population segments; long-time residents, and those in the "back-to-the-land" movement, a movement which she characterizes as a cultural movement stemming from the late 1960s. The movement is motivated by a desire to relearn how to live on land in a way that would meet minimal human needs without causing permanent damage to the natural environment. In her sample area, 43% of the land was owned by six of the ten largest landowners. These holdings occur in the northern end of the watershed, the lower elevation, low-gradient sections where land could be developed, livestock could be grazed, and the timber resources were most accessible.

Chapter Five
SYNTHESIS AND INTERPRETATION

This section of the analysis is being used to assess the current status of all the interacting processes at work in the watershed and focus that information as it relates to the Issues and Key Questions identified in Chapter 2.

Watershed-Specific Issues

Anadromous fish habitat and populations in Honeydew Creek

1. How has anadromous fish habitat changed since 1850? Since 1950?

No information was available to assess the status of fish habitat prior to European settlement, or up until the post WWII era. Some assumptions can be made, however, about the general watershed conditions which may have may have affected fish habitat. Prior to the mechanization of timber harvest and the proliferation of roads, anecdotal evidence suggests that anadromous fish stocks in the Mattole River system were abundant. Landslide and erosion history mapping indicates that there were only two major chronic contributors of sediment working in the entire watershed; Heart-shaped and Recovery slides. After the intensive logging era and the major floods of 1955 and 1964, hundreds of new landslides dotted the landscape and were concentrated in areas of intense roading. At the same time, the hydrology of the BEAR TRAP stratum was altered by a type conversion from forest to open grazing land. Due to the steep gradients throughout the watershed, sediments from these sources were mostly transported out of the watershed and stored in the lower gradient mainstem reaches of Honeydew Creek and in the Mattole itself. The most productive reaches, particularly for chinook salmon, are the low-gradient reaches which were significantly degraded by these events. Upper reaches, though subject to chronic inputs and occasional sediment pulses, tend to maintain habitat quality.

2. What is the relative importance of Honeydew Creek to the fish populations in the Mattole River?

The relative importance of Honeydew Creek to fish populations can only be inferred by comparison of habitat conditions and ownership to other watersheds. Honeydew Creek is the fourth largest tributary to the Mattole and, along with Bear Creek, is the least impacted by previous land use practices. Sixty-nine percent is in public ownership and not subject to ongoing timber harvest. The UPPER WATERSHED stratum contains LSOG forest acreage comparable to reference conditions and is undoubtedly a major contributor of high quality water into the system. Lower reaches of the mainstem are very productive and of low gradient, conducive to spawning.

3. What role can road rehabilitation play in restoration of fish habitat in Honeydew Creek?

The importance of road rehabilitation in the restoration of fish habitat is relatively minor, while the maintenance of existing roads is of high priority. The abandoned road network has been assessed for its restoration/rehabilitation potential. As noted in previous documents, most sediment inputs from the logging roads and skid trails of the 1950s and 1960s have already occurred and the land appears to be in a healing process. Landslide mapping confirms this perception. Current mapping indicates a background rate of landslide occurrence and activation similar to the pre-logging era. A few remaining road reaches were determined to have potential for major inputs and have been identified for rehabilitation where appropriate. The system road network, however, continues to be a cause for concern. Culvert failures result in major sediment inputs. The upgrade of drainage structures and a continuing program of road maintenance are the most effective means of minimizing future sediment inputs. Of major concern is the King Range Road. Though 3.5 miles of the road have been entirely decommissioned and restored to the original contour, another two miles of this road are still subject to failure in this watershed and up to four miles in the adjacent Bear Creek watershed. The huge fills, extremely steep topography, and intense rainfall events offer many opportunities for catastrophic failure involving thousands of yards of material. Persistent maintenance of this road is needed.

4. How have fish populations changed since 1950?

Information on fish populations is largely anecdotal. Large declines are documented since the early 1980s. Declines in chinook appear to be related to the degradation of mainstem habitat as a result of the sediment inputs from the 1955 and 1964 floods and the land use practices that preceeded them. These sediment inputs continue to affect the mainstem and estuary conditions which are important to out-migrants.

5. What activities can BLM undertake to improve fish habitat in Honeydew Creek?

No specific habitat deficiencies are identified. In general, the processes which maintain fish habitat in Honeydew Creek remain intact with the exception of BEAR TRAP. Sources for large woody debris are available in LSOG stands which occur mostly along drainage bottoms and water quality appears to be good. BEAR TRAP is deficit in large woody debris due to the type conversion which occurred in the 1960s. Subsequent replanting to conifer will ultimately renew this source but the positive benefits of this action are extremely long-term as are the positive benefits to water temperature. Sediment inputs are apparently declining; however, occasional inputs from failed roads continue to occur. Continued road maintenance is the single most effective action to preserve and maintain fish habitat.

Roads and transportation system

1. Which roads in Honeydew Creek watershed are necessary to keep open for purposes of BLM and private landowners?

The system road network has been identified and is discussed in the Current Conditions chapter. Drainage upgrades and continuing maintenance is ongoing.

2. Which roads are not maintained to meet the objectives of the Aquatic Conservation Strategy? How can BLM change the maintenance of these roads so they are up to standards?

Non-system roads and the remaining problem areas on those roads have also been identified. Most of these roads are not accessible to motor vehicles. Only short reaches still pose sedimentation problems and are identified.

3. Which unnecessary roads, landings and skid trails are high priority for potential restoration projects?

After a complete inventory of the watershed, only a few road reaches have been determined to warrant rehabilitation, along with landings and skid trails.

4. What considerations should BLM take into account when developing the Transportation Plan required by the ROD?

The major consideration in any transportation plan in the King Range Conservation Area, from an ecosystem management perspective, is the potential contribution of sediment from that road into the drainage system. This can be achieved through a commitment to proper design and maintenance of road drainage.

Fire management

1. What is the natural role of fire in the watershed?

It is clear that natural fire created and maintained an intricate vegetative mosaic in this watershed. Several trends in natural fire can be inferred from current and historic vegetation information. Natural fire was most active in the high elevations of the watershed. Ridgetop lightning strikes and the dominant offshore wind pattern created fires which skunked downhill from the ridgetops, occasionally breaking into crown fires and burning back to the ridgetop. This type of activity was most prevalent in the UPPER WATERSHED and is revealed by a historic vegetation composition which, on the ridgetops, contained significantly less LSOG forest than the other strata. The upper third of the slopes were maintained in younger seral stage conifer, hardwood, and brush, while the drainage bottoms remained relatively unaffected by fire. BEAR TRAP and the EASTERN WATERSHED contained younger seral stages in the upper third of slopes as well, but in smaller patches with extensive areas of LSOG forest. Ridgetop grasslands and brush patches were evident on Wilder Ridge and Bear Trap Ridge. There is no evidence of natural fires sweeping across the watershed from end to end from either the east or the west, or of natural fires originating in drainage bottoms and burning to the ridgelines.

2. Is fire currently acting as a natural process affecting the ecosystem?

Fire currently acts as a natural process in the UPPER WATERSHED. Fire suppression here has been minimal, human-caused fires have not occurred, and the vegetation mosaic closely mimics the historic composition. Fire suppression activities and extensive logging in the EASTERN WATERSHED have interrupted the natural fire regime. The vegetation mosaic has been homogenized, creating larger stands with a predominance of early and mid-serai brush, hardwood, and conifer. The extensive LSOG stands which

were maintained by natural fire have been harvested. Subsequent fire suppression activities created heavy fuel buildups which are apparent here. Wilder Ridge now has many homesites exacerbating the fuels/suppression syndrome. In the BEAR TRAP stratum, extensive logging and type conversion eliminated the natural fire regime. Young brush and hardwoods dominate this stratum creating light, flashy fuel loading which could threaten young plantations.

3. What are the limitations to maintaining fire in its natural role?

There are no limitations to maintaining the natural fire regime in the UPPER WATERSHED. Local residents express concerns about fire from this stratum sweeping across the watershed from west to east (south to north), but there is no historic evidence of such an occurrence. There remains in place a system of natural fuel breaks in the drainage bottoms. These are continuous LSOG stands in moist situations which will not allow fire to traverse the watershed. Extreme fire conditions in this watershed are accompanied by offshore flow which moves natural fires toward the ocean. Onshore flows, which could push fires toward residents only occur with advancing frontal systems which carry moist humid air. In the EASTERN WATERSHED, a natural fire regime cannot currently be maintained. Ridgetop areas which traditionally burned are residential areas, and the LSOG stands which served to isolate natural fires on ridgetops have been eliminated. Heavy fuel loading and the residential/wildland interface create a full suppression situation in this stratum. The stratum should be further isolated from the UPPER WATERSHED by maintaining a fuel break along the strata boundary, along Bearwallow Ridge. From this break, some fuel management and treatment activities can be initiated which address the residential/wildland interface problem, and human-caused fires in populated areas will not cross into the UPPER WATERSHED, causing catastrophic loss of those habitats. BEAR TRAP cannot be managed under a natural fire regime at this time as well. Reforestation of the subwatershed is essential to the eventual recruitment of LSOG habitat here. For the next several decades, young, established conifer stands will be vulnerable to human-caused fires originating in populated areas of the watershed. Full suppression and continuing stand management is necessary to reduce the risk of loss of these stands.

4. Where are the priorities for fire suppression within the watershed?

Priorities for fire suppression are on Wilder Ridge due to the residential/wildlands interface, and in BEAR TRAP due to the need to protect reforestation efforts. Resource risks are high in these strata. (See question 3 above.)

Developed and dispersed recreation

1. Are any existing developed campgrounds inconsistent with the Aquatic Conservation Strategy or other standards and guides in the ROD?

There is one campground in the watershed. It is located within the interim Riparian Reserve on the lower mainstem of Honeydew Creek. This campground has recently been redesigned to minimize impacts and ensure compliance with the ROD S&Gs.

2. Are existing pedestrian and equestrian trails consistent with the objectives of the Aquatic Conservation Strategy, and other standards and guides in the ROD?

The trail system consists of the King Crest trail, Lightning Ridge trail, and Miller Loop trail. With the exception of Miller Loop, these are ridgetop trails. There are no areas where the trails concentrate runoff potentially leading to erosion hazards. The trails are, for the most part, well outsloped and are maintained frequently. The Miller Loop exhibits no drainage problems.

3. What considerations should BLM take into account when planning for future recreation use? In planning for future recreation use, the prime consideration should be the placement of roads, campgrounds, and trails so that they do not contribute sediment into the drainage network. Additionally, trails and facilities should be placed so that disturbance to listed species and their habitats is minimized.

Livestock grazing

1. What is the extent (number of animals, types of animals and number of acres) of historic grazing in the Honeydew Creek watershed?

Numerical data for numbers of animals and acres is not available. It is known that large-scale grazing occurred throughout much of the lower elevations of the watershed, and that suitable grazing land was maintained through the use of prescribed fire. Historically grazing was predominantly by sheep. As more land was converted into grassland, animal type shifted to cattle.

2. What is the extent of current grazing?

Current grazing is limited to small-scale "hobby" level of grazing on small individual ownerships. There are no active grazing permits on public lands in the watershed.

3. What have been the effects of grazing and associated land uses on the vegetation? the streams?

Past grazing practices have significantly affected the Bear Trap Creek drainage. Type conversion, repeated burning, trampling of streambanks, and removal of riparian vegetation has severely degraded fish habitat and hydrologic function.

Habitat for wildlife, especially endangered species

1. How much late-successional/old-growth (LSOG) habitat is there now and how is it distributed?

LSOG habitat, with a minor exception in the EASTERN WATERSHED, is contained entirely in the UPPER WATERSHED stratum. There is approximately 2,000 acres when older hardwood stands are included.

2. How much LSOG habitat occurred in the watershed historically and how was it distributed?

Considered as percentage of each stratum, the UPPER WATERSHED historically contained the lowest ratio of LSOG (39%) when compared to BEAR TRAP and the EASTERN WATERSHED. This was because of the higher fire frequencies experienced

along the King Crest. The upper third of the UPPER WATERSHED was maintained in younger seral stages. Historically, BEAR TRAP was 60% LSOG and the EASTERN WATERSHED was 48%, together contributing 3,600 acres of LSOG habitat. These are not fixed percentages and represent a point within a range of natural variation. Data was not available to fully determine this range. It is reasonable to assume that the UPPER WATERSHED still functions within that natural range, and that BEAR TRAP and the EASTERN WATERSHED would never have reached current levels without extensive intervention by logging and type conversion.

3. How much LSOG could potentially exist in the watershed in 25-50 years?

   The UPPER WATERSHED is presumably within its natural range with regard to LSOG acreage and would not be expected increase over the next 25-50 years. Some maturation of young hardwoods in previously harvested stands and ingrowth in one upslope mid-serai conifer stand will provide minor recruitment on the order of an additional 200 acres. In the EASTERN WATERSHED, maturation of hardwoods will recruit approximately 250 acres in 25 years and up to 750 acres by the fifth decade. Ingrowth in a large D3M Douglas-fir stand in the lower one-third slopes of the East Fork will produce minor gains of 50-100 acres in 25 years and up to 300 acres by the fifth decade. These gains are relatively minor and may produce the potential for one more owl territory to establish along the East Fork. The BEAR TRAP stratum will provide no appreciable gains in LSOG habitat through the next 5 decades.

4. What management actions could be implemented to accelerate development of LSOG and where should these actions be placed?

   Throughout most of the watershed, regrowth in previously harvested areas has already occurred, mostly in the form of now mid-serai hardwoods with a minor conifer component. Elimination of these hardwood stands and replacement with conifer is not cost effective and of little ecological value. Significant stands of D3M (early seral Douglas-fir) occur in the UPPER and EASTERN watersheds. These stands have potential for short-term recruitment into LSOG structural conditions if enhanced through timber stand improvement. In BEAR TRAP, where extensive planting of conifer has occurred, the most beneficial management activity for developing stands is full fire suppression at this time, followed by appropriate thinning to promote LSOG characteristics. There may also be opportunities here for manipulation of young hardwoods to provide space for increasing planting, thereby strengthening the conifer component in the new stand.

5. How will the LSOG potential meet the objectives of the Northwest Forest Plan?

   The Northwest Forest Plan designates the King Range as a Late Successional Reserve. The purpose of these reserves is to protect and enhance conditions of late-successional and old-growth forest ecosystems, and old-growth forest related species including the northern spotted owl. The further advancement toward these objectives in the Honeydew Creek watershed is limited over the next five decades. The watershed does currently provide a stronghold for LSOG dependent species in the UPPER WATERSHED where

LSOG conditions are being maintained at levels similar to pre-settlement conditions. It is assumed that the King Range would need to meet the 20-pair objectives necessary to sustain a viable population center. Currently there are 10 known territories in the King Range. A full assessment of the potential for the KRNCA to achieve the 20-pair goal has not been completed.

6. How does management for LSOG affect other species management such as deer and how will that affect deer hunting opportunities for the public?

Deer populations are dependent upon early and mid-serai forest habitat. Logging and burning in the 1960s and 1970s would have provided for very high deer populations. As LSOG habitat develops, low and mid-serai acreage will decrease and presumably deer populations as well. Deer hunting opportunities as a function of numbers of deer would be expected to decrease as well.

7. How well does the current condition of the forested landscape provide for connectivity between LSOG stands within the King Range NCA and between the KRNCA and adjacent Late Successional Reserves (LSR)?

Connectivity between LSOG stands within the King Range NCA is presumed to be adequate on the east slope, but inadequate on the west slope. A "50-11-40" analysis was completed for the KRNCA. The west slope met the 11-40 condition on only 11% of the landscape compared to 37% on the east slope. The west slope is extremely steep with extensive bare, eroded areas where natural slides dominate. Fire frequency is very high and limiting to LSOG development. These are natural phenomena. Though consistently below the 50-11-40 standard on a quarter township basis, the east slope supports relatively continuous LSOG forest along the major drainages and the hardwood canopy is relatively continuous and in many cases contributes significantly to connectivity. With respect to connectivity beyond the boundaries of the KRNCA, some continuity exists to the east and to the southeast, while habitat barriers occur to the north and south.

Water Quality

1. Are there any toxins which affect water quality in Honeydew Creek? No toxins are known to affect water quality in Honeydew Creek.

2. Are there any water quality problems which limit beneficial uses of water in Honeydew Creek?

Summer water temperature is a water quality concern in Honeydew Creek. Coldwater fish are considered a beneficial use under the federal Clean Water Act. Temperatures exceeding 68° F are considered stressful to native anadromous salmonids. Electronic temperature data loggers were placed into lower Honeydew Creek, near the Wilder Ridge Road bridge, from July 31, 1996 through October 7, 1996 (68 days). Maximum daily water temperature exceeded 68° F for 51 days (nearly consecutive days) from July 31 through September 22. The maximum temperature was 74° F, which occurred on three days. The upper lethal temperature for coho salmon is reported at 78° F (Bell 1991). Although summer water temperatures remained below the lethal level, temperatures were

well above the stressful level for native salmonids for a significant period of time during the summer. Stressful temperature levels can decrease survival and reduce (or cease) growth.

On September 8, 1972 the water temperature in Honeydew Creek at the Wilder Ridge Road bridge was recorded at 74° F at 3 PM. On August 13, 1973 the water temperature at the same location was recorded at 79° F at 5 PM. Both of these measurements were made with a hand held thermometer.

3. What role does Honeydew Creek play in Mattole water temperatures?

Water temperatures were recorded using electronic temperature data loggers in the Mattole River at a location just upstream from the confluence of Honeydew Creek from July 31 through October 7, 1996. Comparing the temperature data from the Mattole River to Honeydew Creek shows the maximum daily temperatures in Honeydew Creek are consistently three to five degrees lower than temperatures in the Mattole River. Since Honeydew Creek comprises a significant portion of the low flow volume during the summer, it is surmised that Honeydew Creek has a slight cooling effect on the Mattole River during the summer months although further investigations of this question are needed.

Much of the lower Mattole River and its tributaries suffer from high summer water temperatures. 1996 data from the lower Mattole River show temperatures exceeding 80° F. From this perspective, temperatures found in Honeydew Creek seem more suitable for native fishes than most of the river and tributaries found downstream.

Wilderness Management

1. Are there sensitive areas where recreation or visitor use should be restricted or prohibited to preserve the identified wilderness characteristics?

The primary wilderness use in the watershed is backpacking or day hiking. Such uses should not be directed into LSOG areas which have high sensitivity, such as owl territories. Trails and access should be managed primarily along ridgetop routes to avoid important LSOG areas.

2. What recommendations from the watershed analysis should be included in the wilderness management plan and fire management plan?

The wilderness management plan should include provisions for maintaining the fuel break on Bearwallow Ridge, and for maintaining the natural fire regime in the UPPER WATERSHED. Fire suppression activities should be limited in nature. Fires should be monitored, allowing natural wildfires to burn as long as predictable fire behaviour continues. The fire plan should address potential for cooling hotspots if necessary to manage fire behavior. Contingencies which activate direct attack should be analyzed in the "Escaped Fire Analysis".

3. How can fire be used to enhance or maintain wilderness characteristics?

Maintain the natural fire regime in the UPPER WATERSHED.

4. What major restoration projects require the use of mechanized equipment and should be considered prior to potential wilderness designation?

Fuelbreak maintenance on Bearwallow Ridge may require the use of chainsaws and should be initiated prior to wilderness designation.

Standardized core questions for watershed analysis

1. What are the current conditions and trends of the dominant erosion processes prevalent in the watershed?

Currently the dominant erosion processes in the watershed are moving toward the natural range. Erosion processes were accelerated by the 1955 and 1964 floods which followed the intense logging era and are subsiding toward natural background levels.

2. What are the current conditions and trends of the dominant hydrologic characteristics and features prevalent in the watershed?

Current conditions are apparently not within the natural range of variation in the BEAR TRAP stratum where past logging, type conversion, and heavy grazing have changed the hydrologic characteristics. Hydrologic characteristics are not significantly altered in other strata.

3. What are the current conditions and trends of the prevalent plant communities and seral stages in the watershed (riparian and non-riparian)?

Prevalent plant communities in the UPPER WATERSHED are relatively intact and maintained by natural processes. The forest landscape is apparently within the natural range expected in an area of such high fire frequency. Drainage bottoms have the preponderance of LSOG habitat and riparian zones are well-shaded. These conditions should be maintained within the natural range as long as fire, as an active and natural process, is maintained. EASTERN WATERSHED plant communities have been significantly impacted by timber harvest. This has affected plant community composition, distribution, and seral stage. The stratum is dominated by low and mid-serai hardwood stands and as ingrowth proceeds will show no significant recruitment of conifer. In this vegetation type, timber harvest with no follow-up treatments appears to select toward hardwoods. Some riparian reaches contain significant remnant stands of conifer; however coarse woody debris recruitment is deficient. Fire in this stratum occurred at lower frequencies than the UPPER WATERSHED and historically allowed for LSOG development over a large percentage; however, fire, as a natural process, is no longer allowed to function due to the residential/wildland interface. Fuel loadings are high as is the potential for human-caused fire starts. The potential for catastrophic loss is a consideration. BEAR TRAP plant communities are the most heavily skewed toward

low and mid-serai vegetation types. Historically, this stratum contained the highest percentage of LSOG habitat, all of which was removed by timber harvest and converted by repeated burning. The low and mid-serai hardwood community will dominate this stratum for many decades. Recently replanted Douglas-fir will, in the very long term, provide a significant conifer component. The riparian zone was not only impacted by the removal of overstory, but continued to sustain the impacts of heavy year-long grazing, further reducing riparian function. Amphibian and reptile sampling revealed a species composition which indicated an open, warm, stream habitat.

4. What are the current conditions and trends of stream channel types and sediment transport and deposition processes prevalent in the watershed?

Higher-gradient stream reaches are relatively stable and are boulder-lined or bedrock controlled. These reaches do not store sediments. Lower-gradient reaches continue to sustain the impacts of previous sediment pulses. These reaches store sediments. Low gradient channels remain relatively sediment-filled to the detriment of the aquatic habitats.

5. What are the current conditions and trends of beneficial uses and associated water quality parameters?

The primary concern for beneficial uses is water temperature levels for cold water fish species. Summer water temperatures in lower Honeydew Creek exceed stressful levels for native anadromous salmonids. Summer water temperatures are apparently cooling, however it is not known if or when they will attain the cool tempertures cited by long time residents.

6. What are the current habitat conditions and trends for the species of concern identified in steps 1 and 2.

Habitat conditions for LSOG-dependent species are stable. The UPPER WATERSHED contains nearly all the functional LSOG habitat and is expected to continue to provide stable conditions over time. Very little LSOG habitat exists in the other strata. Ingrowth will provide only minor increase in LSOG through the next five decades. Increases will serve to improve existing owl habitat, for example, but is not likely to provide a basis for significant increases in use by either owls or marbled murrelets.

7. What are the current conditions and trends of the relevant human uses in the watershed?

All available old-growth timber was logged from the EASTERN WATERSHED and BEAR TRAP during the logging era. Some small-scale logging of second-growth and hardwoods is expected to continue on private lands in the EASTERN WATERSHED. Ranching/livestock grazing no longer occurs on the public lands and is limited to large private holdings of land along the lower mainstem of Honeydew Creek. Ranching activity is expected to continue on these long-term, family owned properties. Settlement of "back-to-the-landers" on private lands along Wilder Ridge, in the EASTERN WATERSHED, is expected to continue a gradual increase. Further subdivision and the possible eventual breaking up of larger family-owned holdings could be expected. A

continual, gradual population increase will accompany this development along with increased fire danger and more subdivision roads and attendant erosion problems. Modified fire suppression tactics anywhere in the watershed will become a larger issue as the population increases.

Chapter Six
RECOMMENDATIONS FOR PROJECT PLANNING

Management direction for the Honeydew Creek watershed is driven by the King Range National Conservation Area Management Program (1974). Emphasis is toward management of recreation providing for a broad range of experiences which are generally primitive in nature and are supported with facilities considered the minimum required to manage the visitors in concert with the capacities of the ecosystem. Management direction does not include an expectation of commercial commodity production or the accommodation of uses which degrade the natural setting. Management direction includes the maintenance of a transportation network which provides access points for primitive recreation experiences. This includes a network of trails linking the attractive Lost Coast beach trail with inland areas as well as staging areas and campgrounds with varying levels of amenities. There is also a demand for and a desire to accommodate utilization of special forest products for cultural, personal, and permitted commercial use such as bear grass, mushrooms, salal, and willow.

Given the small size of the watershed, the focused nature of anticipated management actions, there is an opportunity to be relatively site-specific with regard to restoration opportunities and provide specific guidance to management regarding management, fire management, and restoration.

Aquatic Habitat Maintenance and Restoration

The aquatic habitats of the Honeydew Creek watershed are affected primarily by sediment inputs from the active and inactive road network. Small scale timber harvest activities began around 1948. Larger scale harvesting was occurring by 1954 (See Current Conditions). By 1973, harvesting was past its peak activity with very few new areas entered. Following acquisition by BLM, harvest activities soon ceased on public lands while some activities continue to occur on private lands. Data indicates that large-scale degradation of fisheries habitat was precipitated by the floods which followed in 1955 and 1964. Landslide and erosion history mapping indicates that extremely large sediment inputs originated from an extensive network of roads and trails. Today, these inputs have largely subsided. Fisheries habitat in the steeper tributaries of Honeydew Creek are in good condition with the exception of Bear Trap Creek. There are no immediate stream channel modifications necessary. Coarse woody debris inputs from BEAR TRAP and EASTERN WATERHSED are deficient, but improvement is long-term, dependent upon the development of LSOG habitat in this subwatershed. The low-gradient sections of the mainstem of Honeydew Creek still store much of the large sediment input from the floods, as does the Mattole itself. Recovery appears to be occurring but is a long-term process. Elimination of additional catastrophic sediment inputs and control of fine sediments should aid this continuing recovery.

Recommendations:

1. Design culvert upgrades to pass appropriate debris loads.

   Culverts which become clogged with debris pose the largest risk for additional large sediment inputs into the tributaries due to fill failure.

2. Complete detailed, culvert by culvert, drainage assessments of all system roads, recommending additional surface drainage structures and re-contouring of road surfaces (outsloping or berm notches) where needed.

   Fine sediment inputs from road surfaces are exacerbated by long inboard ditch runs and insloped roads. These sediment inputs have deleterious impacts to spawning salmonids.

3. Complete recommended non-system road and skid trail rehabilitation in the locations where the potential for significant sediment inputs persists.

   Sediment source inventories indicate that extensive restoration of previously harvested and roaded areas is not needed. Isolated areas are identified and mapped where remaining fill material poses potential for significant sediment inputs. These include landings and road crossings. (See Appendix C.)

4. Assess opportunities for additional planting of conifers, concentrated on the lower third of slopes where LSOG conditions were historically maintained.

   Restoration of processes which recruit coarse woody debris is long-term. Re-establishment of LSOG conditions in or near the riparian zone is essential to this process.

Terrestrial Habitat Maintenance and Restoration

LSOG habitats, particularly for northern spotted owl and marbled murrelet, are currently limited to the UPPER WATERSHED stratum on Honeydew Creek. With one potential exception, no stand manipulation is needed to enhance LSOG characteristics here. A D3M stand which lies across the de-commissioned section of the King Range Road was apparently the result of an escaped fire or wildfire of human origin. Thinning may be effective here. Fire in its natural role should continue to maintain this stratum. Where previous timber harvest has occurred, in the EASTERN WATERSHED, thinning of the replacement stand may improve spacing, reduce competition, and accelerate development of LSOG characteristics. The D3M stands lying between the East Fork and Upper East Fork (Bearwallow Ridge) may have opportunities for stand enhancement. These stands have the most immediate potential for recruitment of LSOG characteristics and would contribute significantly to available owl habitat. A small D3M stand at the mouth of Bear Trap Creek, near Honeydew campground, may also have improvement potential. BEAR TRAP has been subjected to type conversion. The replacement stand is being regenerated from extensive conifer planting.

Recommendations:

1. Complete an assessment of stand conditions on Bearwallow Ridge and near Honeydew campground to determine feasibility of timber stand improvement work.

D3M stands have the most immediate probability for recruitment of LSOG characteristics. Along the East Fork and Bearwallow Ridge, these D3M stands could connect with remnant D5S stands in the EASTERN WATERSHED, and with D5M stands in the UPPER WATERSHED. This appears to be the only short-term opportunity for establishing an additional owl territory in the watershed and enhances the "take circle" analysis for existing owl territories in the UPPER WATERSHED. The D3M stand in the UPPER WATERSHED should be included in this assessment.

2. Complete timely timber stand improvement on replanted areas of D1G and D2G Douglas-fir stands in BEAR TRAP.

Replanted areas in BEAR TRAP are essential to the long-term re-establishment of a mixed conifer stand in this stratum. Currently, the replanted areas are susceptible to fire because of their small size. Thinning at appropriate intervals will decrease potential for loss from fires and accelerate eventual development of the stand into LSOG.

Fire and fuels management

Fire is the dominant process affecting vegetative structure in the watershed. The role of fire has been pre-empted in the EASTERN WATERSHED and BEAR TRAP resulting in unnaturally high fuel loadings, increased fuel continuity, and a decrease in habitat interspersion and stand diversity. Subsequent residential development in the EASTERN WATERSHED eliminates opportunities for re-establishing a natural fire regime. The need to protect reforestation projects in BEAR TRAP also influences decisions concerning the return of natural fire in this stratum. The UPPER WATERSHED remains under a relatively natural fire regime which maintains habitat interspersion and a discontinuity of fuels. Fire starts are of natural origin and fire behaviors are predictable.

Recommendations:

1. Maintain the natural role of fire in the UPPER WATERSHED by allowing natural fires to burn. Initiate direct attack of these fires only in extreme fire situations where CDF and BLM agree that fire behavior may threaten private property. In all situations, minimize direct attack. Use bucket drops to cool hotspots if deemed appropriate. Assess direct attack needs on a case-by-case basis for human-caused fires which occur under extreme fire conditions.

There is no evidence of natural fires sweeping across the watershed from west to east (south to north). LSOG forests along the drainage network provide natural fuel breaks, isolating fires to the upper third of slopes in the UPPER WATERSHED. Natural fires keep fuel loadings at natural levels and maintain LSOG habitats where they naturally occur.

2. Suppress all fires of either human or natural origin in BEAR TRAP and EASTERN WATERSHED.

The current condition of re-planted conifer in BEAR TRAP makes these stands susceptible to complete loss by fire, eliminating the long-term opportunity for eventual re-establishment of conifers in this stratum. Private property development along Wilder Ridge mandates full suppression in EASTERN WATERSHED.

3. Complete a fuels assessment for the EASTERN WATERSHED and determine the feasibility of instituting a program of prescribed burning to reduce fuels/understory with the goal of lowering fire danger and promoting LSOG habitat recruitment.

Historically, fire frequency in this stratum was much lower than the UPPER WATERSHED. Fire activity was low along Wilder Ridge and somewhat higher in the headwaters (upper third of slopes) of the East Fork. Consider prescribed burning to reduce fuel loadings and improve LSOG recruitment along Bearwallow Ridge and to reduce fuel loadings and maintain habitat interspersion in the East Fork headwaters.

4. Isolate full suppression areas from natural fire areas by maintaining a shaded fuel break along Bearwallow Ridge. The fuelbreak will connect from the terminus of the King Range Road at the Lightning Ridge trailhead with the Smith-Etter Road.

A fuelbreak along Bearwallow Ridge was established in August 1990 as the King Fire burned in the UPPER WATERSHED. It is not currently maintained. It will provide a fire suppression boundary controlling the spread of fire into, or out of, the EASTERN WATERSHED. It also provides a point of origin for implementing a prescribed fire program, as well as mechanical treatments for accelerating recruitment of LSOG and improving the effectiveness of, and maintaining, the shaded fuelbreak.

Cooperative management

The health of the Honeydew Creek watershed directly affects its residents as well as the residents of the entire Mattole. Residents are intensely interested in management of the public lands and the influence of this management on their lives. In addition, other agencies, such as California Department of Fish and Game, California Department of Forestry, Fish and Wildlife Service, and numerous others have regulatory and programmatic responsibilities on both public and private lands in the watershed. The health of the system and the implementation of effective management is highly dependent upon good cooperative relationships with residents and other agencies, a particular point with regard to the contribution of private lands to the restoration and maintenance of both terrestrial and aquatic habitats.

Recommendations:

1. Schedule "town meetings" in the Mattole to discuss issues of importance and management of the public lands with residents.

Much resistance to ecosystem management techniques is the result of a lack of coordination with residents. Knowledge of how land management is affecting

residents and adding their perspective to program goals and project design enhances management effectiveness.

2. To maximize economic benefits and develop sense of stewardship within the watershed, utilize community groups where possible to complete restoration and fuel treatment programs through direct contracting, cooperative agreements, special hiring provisions in contracts, etc.

Residents have a direct relationship with their watershed and the Mattole system. Ecosystem management objectives are best achieved and maintained when the local community shares those objectives and is involved in implementation.

3. Continue coordination with California Department of Forestry and Fire Protection (CDF) for the implementation of suppression policies and fuels management.

Fire protection is responsibility of CDF. They also have personnel and programs which can be directed toward fuels management.

Monitoring and Data Needs

Implementation of the Northwest Forest Plan has increased the emphasis on anlaysis of watersheds and landscapes as an integral step in project planning. Watershed analysis, as an interim, non-NEPA, step in project planning, allows land management agencies to place their existing data, inventories, and previous planning efforts into a broad information framework which serves to expose data gaps and help prioritize future monitoring and inventory, as well as future project planning. Numerous critical data gaps identified in the previous analysis in the Mattole, the Bear Creek watershed analysis, have been filled, and, at the same time, those data collected for the Honeydew Creek watershed analysis. Examples include:

* Mapping of unstable areas to be included in Riparian Reserves
* Inventory of "Survey and Manage" species (ongoing)
* Location, age, and condition of all existing and abandoned roads
* Location, condition, and capacity of all stream crossings
* Mapping of landslides and erosion history
* Inventory to determine species presence and distribution for mammals, birds, reptiles, and amphibians in the "rare" category as stated in the ROD (ongoing)

These data have allowed more comprehensive analysis of Honeydew Creek and provided tangible progress toward implementation of standards and guidelines of the NWFP. Additional monitoring and data needs are described below.

Additional Data Needs

* Seamless vegetation mapping across ownerships - Efforts have been undertaken over the past several years to complete vegetation mapping across the entire "Klamath Province" using computer interpretation of satellite imagery. To date, none of these efforts have produced a vegetation layer of acceptable accuracy. Such a

database would provide a basis for assessing habitats across broad landscapes, connectivity between reserves, and the effective role of federal and private lands in contributing toward the biodiversity of the region.

* Upgraded vegetation mapping on federal lands - The current vegetation mapping used by BLM at the land-use planning and site-specific project planning levels utilizes the Californian Wildlife Habitat Relationships system. The system provides a relatively accurate basis for predicting and characterizing habitat suitability; however, the system contains size class categories which are often too broad for distinguishing the specific attributes for some species. The system also has no provisions for identifying and characterizing multiple forest canopies, or subseries of understory vegetation, all critical parameters for predicting habitat use. BLM has funded an upgrading of vegetation mapping consistent with the methodology used on the Six Rivers National Forest to meet this need. The database will also provide a basis for modelling stand development over time.
* Site-specific climatological information - In anticipation of the use of prescribed fire and modified suppression, site-specific weather and fuels data is needed. These would include, for example, diurnal variation, seasonal and diurnal fuel moistures, etc. Additional sets of weather data are needed to more accurately predict local rainfall events. Correlations between "event" rainfall, as opposed to annual rainfall, and stream discharges are needed to better calibrate models used to determine culvert sizing and road upgrades.
* Long-term annual northern spotted owl territory and marbled murrelet monitoring - Owl and murrelet monitoring is typically directed toward clearances to avoid "take" during project implementation, yielding little or marginal information as to the long-term viability of these sites. Murrelet stations need to be located in prime habitat to attempt to determine their presence in the King Range and not limited to habitat which happens to occur near project locations just to meet strict consultation requirements under the Endangered Species Act.
* Other LSOG-dependent species surveys - A host of other species are identified in the NWFP as requiring additional attention when planning and conducting land management activities. There is a need to continue, and to broaden the scope of, inventory and survey for species on the "Survey and Manage" list and mentioned elsewhere in the ROD.

Monitoring

The Northwest Forest Plan identifies three levels of monitoring to evaluate the efficacy of management practices:

Implementation monitoring - Determines if the standards and guidelines were followed. This monitoring is being conducted at two levels within the NWFP area. At the plan level, the Regional Ecosystem Office, working with the Intergovernmental Advisory Committee, conducts annual monitoring of various aspects of implementation. In 1996, the effort was focused on implementation of the standards and guidelines affecting timber sales. The 1997 monitoring will

continue on timber sales and also include riparian reserves and roads. At the local level, the Resource Area maintains an implementation monitoring team with the responsibility of screening all proposals for compliance with appropriate standards and guidelines.

Effectiveness monitoring - Evaluates whether the application of the management plan achieved the desired goals, and if the objectives of these standards and guidelines were met. An Effectiveness Monitoring strategy has been adopted by the Regional Ecosystem Office and Intergovernmental Advisory Committee. The strategy identifies five areas of concentration; late-successional forest, northern spotted owl, marbled murrelet, "Survey and Manage", and riparian and aquatic. The strategy addresses these issues at the NWFP level recognizing that the answers to monitoring questions must generate from a variety of scales. At the Resource Area level, the same five areas of concentration affect the daily implementation decisions involving the NWFP. These areas are the focus of inventory and monitoring at the watershed scale.

Validation monitoring - Determines if a cause and effect relationship exists between management activities and the indicators or resource being managed. These include "big-picture" monitoring questions about the NWFP assumptions. For example, "Do the habitat conditions (resulting from implementation of the standards and guidelines) support stable and well-distributed populations of late-successional associated species?" Are rangewide, provincewide, and regional populations stable or increasing? The questions are broad scale, requiring controlled, long-term demographic information for species, and repeatable remote sensing application to track habitat trends over time. Generally, the questions are not applicable at the Resource Area level.

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Appendices

Appendix A

THE HISTORY AND SOCIOLOGY OF THE HUMAN PRESENCE IN HONEYDEW CREEK WATERSHED, MATTOLE RIVER, SOUTHERN HUMBOLDT COUNTY, CALIFORNIA

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for
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November 1, 1995

This report is intended to supplement the Honeydew Creek Watershed Analysis conducted by the U.S. Bureau of Land Management in 1995 and published in 1996. It summarizes the results of social and historical research done during the 3 month period from August to the end of October. The purpose of the research was to collect, in a systematic way, whatever information or observations might be provided by members of the public who have some relationship to the watershed for use by the various members of the analysis team. In addition, a context for that information is provided by historical and statistical research. Since the purpose of the report is supplemental, the boundaries of the research were necessarily drawn to include areas outside the researcher's expertise in order to collect information useful to the team.

This report, therefore, should not be considered definitive on matters other than ethnographical and sociological ones. Although standard ethnographic and sociological procedures were used to collect the data from informants, no attempt was made to verify any of that material or to adjudicate areas of disagreement between informants. Information presented by informants comes "as is," unlike data derived from printed materials and its analysis.

METHODOLOGY

The information on which the social portion of the BLM Honeydew Watershed Analysis is based was obtained by 4 methods: 1) a search of the historical and ethnographic literature, 2) an analysis of county tax records, 3) a survey distributed by mail or administered by telephone, using the same questionnaire that was mailed and, 4) taped interviews.

Literature search

The literature search included only those materials available at the Humboldt State University library and the Arcata Resource Center of the BLM, both located in Arcata, California. The focus of the search was the history and prehistory of Honeydew Creek watershed specifically, although some information is included on events occurring outside that watershed on the basis that they may have had an impact on the history of the Honeydew watershed. The assumption was made that a more general picture of the history and prehistory of the Mattole Valley is included in BLM's Bear Creek Watershed analysis and that aspects of Mattole Valley history that may have had a different impact on the Honeydew watershed than the Bear Creek watershed could be specified.

Tax record analysis

A sample area was selected within that part of the watershed in which most of the private ownership occurs. The sample area analyzed is that area of the Honeydew watershed that appears on the 7.5 minute USGS "Honeydew" map. County tax records available at the Arcata Resource Center and bearing a copyright date of 1994 were obtained and correlated with topographic maps to determine which parcels were located within the sample area and who owned them. Records pertaining to any private land within the watershed but outside the sample area were not included, the assumption being that an analysis of the most densely occupied area of private ownership would be sufficient to meet the needs of the analysis team.

The parcel maps were compared to topographical maps on which the watershed boundaries had been drawn, following ridgetops. Parcels bisected by the watershed boundaries were included if a gross visual estimate indicated that more than 15 acres of the parcel was

located inside the watershed. The area of such parcels that lies within the watershed boundaries was roughly estimated by visual comparison to the area covered by a parcel known to consist of 40 acres. A transparent piece of paper with an outline of that parcel was placed over a topo map on which parcels had been drawn in by John Price of the BLM and a comparison made as to how many of these 40 acre squares would fit into the area of a given parcel that fell within the watershed boundary.

The same method was used to estimate the size of parcels for which the acreage was not listed on the county tax assessor's list of owners by parcel number. Where county records disagreed with BLM information or with information obtained by survey or interview, the BLM, or research material was assumed to be correct and was used for statistical purposes rather than the county records.

In cases where the BLM parcel map combined a number of parcels into one area and the county records listed no acreage for the parcels, an average parcel size was derived by estimating the total area and dividing it by the number of parcel numbers included in that area. For statistical purposes, the average size was then multiplied by the number of parcels within the combined area owned by a given owner and added to that owner's total acreage within the sample area.

The estimate of population density was based on the assumption that any parcel for which the county records listed improvements contained one residence. It was further assumed, following standard statistical procedures, that each residence housed a family of four. This assumption was supported by five residential questionnaires (survey section) reporting the number of people living on the parcel occupied by the respondant. These were 3, 7, 4, 2 and 5. The number of improved parcels was multiplied by four to obtain an estimate of the population living on private land in the sample area. The total acreage of all the land contained in the sample area, including parcels owned by the BLM, was then divided by 360, the number of acres in a square mile and this number was divided by the estimated population to derive the population per square mile in the sample area. This last step contained the assumption that no one resides permanently on land owned by the BLM in the sample area.

The estimate of possible back-to-the-land families was made by first eliminating parcels owned by persons with names known to be those of old ranching families (5). The second criteria, the size of total holdings, was applied to the remaining 32 on the assumption that back-to-the-land families buy smaller parcels, at least initially, for the purpose of homesteading, rather than larger ones for commercial purposes. Persons with total holdings of over 100 acres were therefore assumed to not be back-to-the-landers (5). Persons with under 100 acres who did not have oldtimer names were placed in the potential back-to-the-lander category (27). The choice of 100 acres as the cut-off point was arbitrary, the best-guess option in the absence of independent studies quantifying the average size of landholdings of back-to-the-land proponents. One owner with over 100 acres who self-identified as a back-to-the-landers was added to that category based on that self-identification, making the total potential back-to-the-land population in the sample area 28. -

Survey

A 4-page questionnaire on the history of ecological processes in the watershed was used to survey a sample of 117 individuals who either expressed interest in the watershed, who are

present or former residents, or who own land there. These were divided into supporters, on the one hand, and residents and owners on the other, based on the source from which their names were obtained. Residents and owners were asked to complete a supplement to the questionnaire with questions specific to their own land. A list of resident/owners was derived from county tax records.

The list of supporters was derived from a list of attendees at a Mattole Watershed Alliance meeting held in the year preceding the start of the research, in the following manner. Names that appeared on the list of known residents or landowners in the watershed were removed from the MWA list as duplicates. Other names were removed on the basis of the personal knowledge of the researcher that the individuals were unlikely to have specific knowledge of the watershed. Names of persons likely to have specific knowledge of the watershed were added to the list, based on the personal knowledge of the researcher or members of the watershed research team. As the survey proceeded, names were continually added to the list of possible contacts as those interviewed responded to a request for additional names included in the questionnaire. In this manner a list was derived of a total of supporters.

A third, short list was developed from the first two, consisting of "oldtimers," i.e., persons whose relationship to the watershed was so extensive that the questionnaire was deemed insufficient to make the most effective use of it. Those on the oldtimer list were removed from both of the first two lists. The resident and supporter lists were divided into those with at those without telephones. All of the 65 numbers on the "telephone" list were dialed. Three were crossed off the list when it was found that their telephone had been disconnected or that an incorrect number had been provided by the source list. Successful contact was made with 32 people by telephone of whom 16 declined to participate, claiming insufficient knowledge, interest or time. Sixteen people were administered the questionnaire by telephone.

Forty-nine questionnaires were mailed to residents, owners and supporters who did not have telephones. Of these, 4 were returned by the post office, unopened, with incorrect addresses. Four were returned by individuals who declined to participate. Thirty-eight questionnaires mailed generated no response at all. Three were completed and returned.

The questionnaire was composed on the basis of the stated goals of the watershed analysis team. It was edited and approved by Gary Pritchard-Peterson of the BLM before it was administered.

4)Interviews. A total of 3 individuals were interviewed by the researcher, who recorded the comments of 2 with a tape recorder and 1 by taking copious handwritten notes. Several prospective interviewees were eliminated on the basis of their health. These included longterm Mattole Valley residents Lee French, Russell Chambers, Raymond Etter and Frank Landregen. Mr. Landregen, however, was able to answer some of the questionnaire by telephone.

Some telephone conversations expected to result in a completed questionnaire became generalized telephone interviews instead when the researcher decided that the participant was more comfortable with an interview format than a survey format. This information was included with the survey information when the relevant information was provided, even though the few situations where this occurred represented a departure from strict survey techniques in that some questions were never asked and many were answered out of order. In these cases, a typed summary of the remarks was attached to the questionnaire and answers to specific questions

extracted and filled in by the researcher.

Transcripts of the 3 interviews as well as all of the questionnaires accompanied the delivery of this report to the BLM office in Arcata. Three informants requested that their names not be published with any quotes used. The questionnaire was used as a general guide for the interviews, but interviewing techniques were given priority over survey techniques in the taped interviews. In other words, if the informant departed from the question asked but was "on a roll" and providing useful information, no attempt was made to return her or him to the sequence of questions on the questionnaire.

The researcher interfered with the flow of the informant's thoughts only to insure that the focus remained on Honeydew Creek, rather than on the Mattole Valley in general or on some other tributary of the Mattole. This was found to be an ongoing problem with both interviews and telephone administered questionnaires. Every effort was made to doublecheck that the informants remarks referred to the Honeydew watershed specifically. Transcripts of the interviews are arranged so as to coincide generally with the sequence of questions as they appear in the questionnaire. This was done to facilitate their comparison with data from the survey. A questionnaire was filled out by the researcher for each interview so that the information thus obtained could be included in analysis of survey material. Questionnaires were divided into 3 categories on the basis of the depth of their knowledge of the watershed. The three were l=oldtimers. These have lived their lives in the watershed and were included regardless of their age or they are related to one of the ranching families. 3=limited knowledge based on visiting or short residence. 2= everybody else.

PAST CONDITION

Prehistory

The description of the way in which the prehistoric residents of the Mattole used their resources and their impact on the land appears in the Bear Creek watershed analysis. There is no reason to believe that any prehistoric residents that may have lived in the Honeydew Creek watershed would have differed in any way significant to land use from those described in the Bear Creek Watershed analysis. However, the Honeydew watershed does differ from the Bear Creek watershed in that major differences appear in the ethnographic literature as to what tribe, or more accurately, tribelet, used, lived or had jurisdiction over the watershed.

There are 3 potential sources of information on the prehistory of Honeydew Creek watershed, archaeological, linguistic and oral tradition. Two of these proved to be minimally productive. No archeological or ethnographic publication lists any known sites within the bounds of the watershed. What is clear from the limited ethnographic literature is that within the Honeydew Creek watershed, between Bear Trap Creek and Bear Trap Ridge, there may have been some kind of tribal boundary. There is scholarly disagreement as to the significance of this boundary and exactly where it should be drawn.

A thorough discussion of the boundary dispute is to be found in two Master's theses on file at the Humboldt State University Library (Lassiter, pp. 40-54, Roscoe, pp. 2-3). The authors of both consulted the field notes of C. Hart Merriam on file at the University of California, Berkeley. Lassiter also consulted the original notes of Pliney Earle Goddard, also at U.C. Berkeley. Both works provide comparative maps of the respective tribal boundaries of these two

scholars.

Martin A. Baumhoff's (1958) tribal map represents his reconciliation of the differences in the work of Goddard, Merriam, A.L. Kroeber and Gladys Nomland as to political/linguistic boundaries, and has been the definitive one since 1958. According to his map (Map 14, p.197) most of Honeydew Creek watershed is located in the area of the Shelter Cove Sinkyone. Bear Trap Creek lies in the former territory of the Mattole. High Prairie Creek and a section of the mainstem up and downstream from the mouth of High Prairie Creek is in the area of the Lolangkok Sinkyone. Baumhoff's map indicates that the Lolangkok territory did not include any coast area (Map 13, p.102) and that the coast up to Spanish Flat was controlled by the Shelter Cove Sinkyone (Map 14, p.197. Above Spanish Flat was Mattole territory.

According to Baumhoff, the Mattole/Shelter Cove Sinkyone boundary lies between Bear Trap Creek and the Honeydew mainstem lower reaches, coinciding closely with the present location of Smith-Etter Road. It then curves around to cross the Mattole about a mile from Honeydew at a point nearly coinciding with the line between Sections 5 and 6, R1E, T2S.

Archaeological sites at Big Flat have been well studied by Dave Fredrickson (1975), and Valerie Levulett and William Hildebrandt (1981, 1987) at the behest of BLM. Levulett and Hildebrandt attribute these sites, on the basis of Baumhoff's map, to the Shelter Cove Sinkyone. Mattole place names on the coast, according to Baumhoff based on Goddard's work, extend south only to Spanish Flat. No one of the 4 ethnographic researchers who worked in southern Humboldt County in the first 2 decades of the century (Kroeber, Nomland, Merriam, or Goddard) collected place names from any group for any point on Big Flat or within Honeydew Creek watershed. However, Baumhoff notes that he suspects that a large chunk of Goddard's notes on the Sinkyone, on which Baumhoff was basing his maps and lists, have been lost (1958, p. 165), so that the absence of names at Big Flat should not be taken as an indication that there were none known to or used by the Shelter Cove Sinkyone.

Baumhoff (1958, p.197) places a village site on the west side of the mouth of an unnamed intermittent creek less than 1/5 of a mile west of the Honeydew Creek outlet. His number 42, Map 14, is listed as a Lolangkok Sinkyone village called "djegullindin" a word whose meaning was not clear to Goddard, who got it from his informant between 1900 and 1909. This site name is the southernmost one Goddard listed as Mattole and is the reason why Baumhoff took Goddard's placement of the Sinkyone/Mattole boundary over that of C. Hart Merriam, who placed it 5 miles downriver (Baumhoff 1958, p. 165).

The relevance of the archaeological sites at Big Flat to the prehistorical use of the Honeydew Creek area lies in the assumption that the Big Flat people climbed over the mountains to make use of the Honeydew watershed immediately on the other side. Levulett has concluded that the Big Flat sites were used on a seasonal basis, although she leaves the possibility of permanent villages there open. "It is not entirely clear—whether the Mattole and Shelter Cove Sinkyone occupied permanent coastal villages. It is unlikely that the coast would have afforded a food supply sufficient to sustain year-round settlements (1987, p.20)."

If the Big Flat sites were used by the Shelter Cove Sinkyone, they would have been coming from the Briceland area. The easiest route for them to have taken would have been first to Shelter Cove, then up the beach from there. There is thus no reason to think that they would have used Honeydew Creek watershed to get to Big Flat for their seasonal use.

If any of the Big Flat sites were occupied year round, however, it opens the question of

whether the occupants might have taken the steep climb up Rattlesnake Ridge and into the Honeydew Creek watershed to make use of the inland resources available there. Levulett remarks that year-round occupation of sites at Big Flat "would have necessitated an inland resource procurement strategy (p.20)." Modern hikers often use a BLM-built trail that branches off from King Crest Trail and follows Rattlesnake Ridge into the Big Flat creek watershed. BLM archaeologist Marlene Greenway (personal communication) believes that, before the trail was built, the area was too steep and rugged to imagine any prehistoric group finding it worthwhile to go from Big Flat to the Honeydew watershed by that route.

Assuming that the occupants of the Big Flat sites were Shelter Cove Sinkyone, then their use of Honeydew watershed depends on whether or not they were on the coast year-round and whether they would or would not have found the pre-BLM improved route too rugged to use. Since a route to Big Flat through Honeydew watershed from the Briceland area is probably the most difficult way a Shelter Cove Sinkyone might do it, it seems unlikely that such was the case. A family oral tradition provided by a current resident of Bear Trap Ridge, however suggests such a use and a reason for it. This resident, who requested anonymity, descends from a ranching family who owned much of the eastern side of Bear Trap Ridge. She believes that her great-grandmother, the wife of white settler A.A. Hadley, was a Wailaki and that the sites at Big Flat are Wailaki sites. The informant believes that parts of her family's ranch were traditionally used by her ancestors and were incorporated into Hadley's ranch and had thus been passed on from one generation to the next in a direct line from her Wailaki ancestors.

The informant stated that her grandmother had told her that the Wailakis, thus far considered by scholars to be an inland group, had an agreement with the other tribes in the area (whether Mattole or Sinkyone) to pass through Honeydew Creek watershed to get to Big Flat, where they camped on a seasonal basis to use coastal resources. The sites on her family's former ranch were used by Wailakis as they passed through on their way to the coast.

This informant was adamant that she was descended from Wailakis, rather than Mattoles or Sinkyones. Pointing out correctly that both of the words, Mattole and Sinkyone, were assigned to the respective groups by settlers and/or researchers, she said that her grandmother's word for the ancestral tribe, the word that they used to refer to themselves, was "keh neh' sti" (present researcher's phonetic rendering of informant's pronunciation).

Another member of this family did not recall hearing anything about the Wailaki connection, but had more details about the Native American great-grandmother. According to this informant, Mrs. Hadley was raised in Petrolia by a cheese-making family there, who claimed that she had been adopted. This second informant was open to the possibility that her ancestor was, in fact, one of the many Indian children forcibly removed from their parents and given to settler families as slaves. It was also possible, she said, that Mrs. Hadley had been part white to begin with and that is why the Petrolia family preferred to say that she had been adopted.

According to the family tradition, Mrs. Hadley was kidnapped by members of her tribe after her marriage, taken away, tatooed with the 3 vertical lines on the chin commonly referred to as the number "111" to signify that she was married, and then returned to her husband, with whom she lived thereafter and raised a large family. According to the only publication extant on the Shelter Cove Sinkyone, Grace Nomland's "Sinkyone Notes" (1935), a tatoo that included "1 to 3 lines on the chin (p.162)" was drawn on the faces of Shelter Cove Sinkyone girls as part of their adolescent initiation ceremony.

Greenway (personal communication) commented that the literature attributes the "111" tatoo uniquely to the Yurok. Since Nomland declined to mention whether the 1 to 3 lines of the Sinkyone women were vertical, horizontal or diagonal, the significance of Mrs. Hadley's tatoo to tribal designation depends on the accuracy of the information that it was unique to the Yurok and amount of flexibility to be taken in interpreting Nomland's data. Along these lines, comparative sketches of the chin tattoos of 4 California Athbascan groups including Sally Bell's tatoo appears in Baumhoff (1958, p.185). Nomland makes no connection between marriage and the chin tattoo of the Shelter Cove Sinkyone women, but since initiated women in most tribal societies are soon married, it is not a very big leap to an oral family tradition that the significance of Mrs. Hadley's tatoo was that she was a married woman.

The second informant, who believes, as A.L. Kroeber (1953) originally did, that all of the Indians in the Mattole Valley were Mattoles, raised the possibility that her great-grandmother was descended from a Wailaki who had intermarried with Mattoles, which would explain her self-identification as a Wailaki. Greenway (personal communication) mentioned in this connection that there is historical evidence to support the notion that white settler men found Wailaki women particularly attractive as wives.

Making these oral traditions compatible with the published ethnographic material would seem to require some major adjustments to the published tribal maps for the area. If Baumhoff's map is followed, the Eel River Wailaki do in fact share their eastern boundary with the southern half of the Shelter Cove Sinkyone. However, the Big Flat sites are in the exact opposite corner of the Shelter Cove Sinkyone territory. Assuming that Baumhoff's map is correct and that the Big Flat sites were used by Wailakis, the question arises as to why they would not simply go through the middle of the Shelter Cove Sinkyone territory to Shelter Cove and walk north up the beach.

There is a speculation for this, but it is quite a stretch. The first informant did not specify the tribe from which the Wailaki had secured safe passage. According to Baumhoff the boundary that goes through the Honeydew watershed between Bear Trap Creek and Bear Trap Ridge, separates the Lolangkok Sinkyone and the Mattole. Somewhere between the outlets of the lower East Fork and Bear Trap Creek, the southern border of the Lolangkok curves northwest to intercept their western border with the Mattole. Upriver from there, the line is between the Shelter Cove Sinkyone and the Mattole, and the Lolangkok are cut off from the coast.

If the Lolangkok territory in fact did not curve that way, but extended to the coast south of Big Flat instead and the deal the Wailakis had was with them, not the Shelter Cove Sinkyone, that could explain why Wailakis might go so far north to go west. They would get to the coast while avoiding the Shelter Cove Sinkyone, who, according to Nomland (1935, p. 151), hated and mistrusted them. To make that possibility practical, the Wailakis would have to have had an agreement of some kind also with the Lassik, through whose area they would have to pass to reach the Lolangkok area. The areas of "give" in this problem, as presented by the 2 informants' accounts are:

1) The accuracy of Baumhoff's tribal maps, based on conflicting information collected from no more than 3 aging informants: In the case of Sally Bell, who acted as informant to Kroeber, Merriam and Nomland, an informant who was raised by white settlers from an early age after having witnessed the massacre of her entire tribe, from whose continuing educational effects we

may assume she was cut off by that event. The ethnographic basis for the conflicting maps is shaky at best.

2) Nomland's informant's assertion that the Shelter Cove Sinkyone hated the Wailaki. The less true this is, the more true the oral tradition can be that the two groups had some kind of agreement allowing the Wailaki to get to the coast. Nomland's only Shelter Cove Sinkyone informant was Sally Bell, who was, according to Nomland, so old when she was interviewed that Nomland distrusted her reliability. There is no reason to ascribe less authenticity to the informant's grandmother's statements than to those of Sally Bell. However, it still remains to be explained why, if the Wailakis had a deal with the Shelter Cove Sinkyone, they would take such a circuitous route to Big Flat. The explanation could be that that was the best deal they could work out with the Shelter Cove Sinkyone. In other words, "you can use the area between us and the Mattole on the coast, if you skirt the edge of our territory or work a deal with the other two groups (Lolangkok and Lassik) to go through their territory to use the route through Honeydew watershed."

3)The translation of the informant's grandmother's word, kehnehsti. If it referred to the Lolangkok Sinkyone, rather than the Wailaki, then the informant's family's ranch was in the area that Goddard's informant ascribed to the present informant's ancestors and the deal to use Big Flat was made between two groups who are much more closely linked linguistically than the Shelter Cove Sinkyone were with the Wailaki, and between whom this researcher found no references to animosity.

This assignment of the word to a tribal group would require a full-fledged linguistic survey by a qualified scholar. However, cursory examination of Baumhoff's place names revealed no words with obvious similarities to the word provided by the informant. Other linguistic material was not examined for lack of time.

4) The possibility raised by the second family member that Mrs. Hadley was Wailaki by descent from a Wailaki parent who married into whatever tribe in fact occupied Honeydew watershed, Mattole or Lolangkok. In that case, the word and the tribal maps could all be correct, Mrs. Hadley's daughter was correct that her mother was (part) Wailaki, and that (some of) her ancestors had occupied portions of the former ranch. There is nothing in this possibility that precludes the Big Flat sites from having been used by Wailakis living with Sinkyones through intermarriage. The probability of this being the correct speculation would rest on whether the Mattoles and Lolangkok felt the same way about Wailakis as Nomland claims the Shelter Cove Sinkyone did and whether that influenced marital exchanges. (If wives were stolen by the two groups, it could raise that probability).

In terms of prehistoric land use of the Honeydew watershed with implications for current land management, however, the whole fascinating issue is purely academic, since what little information that is available on all of these indigenous groups indicates that their use of the land and their technologies are very similar. This observation is documented with reference to Kroeber and Barrett's (1962, pp. 150-168) maps of the distribution of fishing technologies of northern California indigenous groups. In 71 maps showing the distribution of fishing tools and procedures among the tribes of N. California, the Mattole differ with the Sinkyone (Kroeber

lumps Shelter Cove and Lolangkok) on only 15. The difference between those 2 groups and the Wailaki is much greater (about half), but the 3 groups are still considered members of the same culture area by Kroeber, who continued to so group them on the basis of technological and linguistic similarities in 1962, when new data on the exact location of their boundaries (p. 149) might have inspired him to reopen the question of their culture area relationship.

The possibility that the trail used by the Big Flat people to go through Honeydew Creek, if they indeed went that way, might have become Smith-Etter Road, was emphatically denied by the second informant. She stated that her father built Smith-Etter road from a former trail used to haul sheep by jeep. He bulldozed it to make it into a logging road. She states that "the Indian trail" went from a point near the old Hadley ranchhouse, over hills completely separate from Smith-Etter road, and came down to the beach at Spanish Flat.

This re-opens the question of the tribal affiliation of the Big Flat people, since they would then have had to walk near campsites attributed to the Mattole and south to Big Flat. That question is resolved if the Big Flat people were Mattoles, rather than Wailaki or Sinkyone, or if there were 2 "Indian trails" through the watershed to the coast, one to Spanish Flat used by Mattoles and one to Big Flat used by the Big Flat people, whoever they were.

By far the most significant way in which prehistoric uses of the watershed may have had an impact on its current overall condition is in the setting of fires to control underbrush and encourage the growth of grass. A thorough discussion of aboriginal land use, including set fires, appears in KRNCA's watershed analysis of Bear Creek. In view of the lack of ethnographic data specific to Honeydew watershed and the well-documented similarity of the southern Humboldt tribes, there is no reason to think that this discussion does not apply equally well to the Honeydew watershed. What may be added to this from the current research will be discussed in the section on Watershed Processes.

History

A search of the historical literature on Honeydew Creek yields only a handful of references to the watershed specifically, supporting the idea that the watershed has experienced less negative impact as a result of human occupation than any other in the Mattole Valley. So little historical mention would support the notion that human activities in the Mattole Valley were concentrated elsewhere. Ken Roscoe's Heydays in Humboldt (1991, p. 20) mentions only some camping in the area of Fox Springs on a trip his family made and makes a passing reference to the BLM's presence (p. 133). T.K. Clark's history of Petrolia (1983) refers to Wilder Ridge and Wilder Ridge Road in general (pp. 93-94) but no particular parts of it. The Hadley family of Bear Trap Ridge is mentioned by Clark, who tells of the drowning of two daughters (pp. 93-94), and in a very recent history done for BLM by Bright Eastman (1995).

Other than these scattered references, the activities of the non-indigenous inhabitants of Honeydew Watershed must be inferred from statements made by their descendants in connection with the issues covered by the survey. These will be presented under the headings of "past conditions" and "processes" in the watershed.

PAST CONDITIONS

Erosion

A discussion of the history of major areas of erosion in the Honeydew watershed appears

in the Mattole Restoration Council's Elements of Recovery (1989). There were no data gathered in the course of the social survey which appeared to the researcher, whose are of expertise is not geology, to conflict with any of the information provided by the council. Most of the information from the survey referred to the recent history of the watershed and is included in the section on "present conditions." What other remarks appear relevant are provided below.

Anonymous oldtimer (50 years) perceived erosion from both natural and human causes to have increased since her childhood. She remarked that she remembers no large earthquakes and only two large slides, one near Honeydew on the Mattole and one "near Shinns," neither of which are technically in the Honeydew watershed.

Linda Franklin: Those streams (Bear Trap Creek and others), especially Honeydew Creek, looked completely different after the '55 flood, the Mattole changed too. The area below our house changed drastically. The creek straightened out. That's the whole problem with the Honeydew watershed. Honeydew used to wind back and forth, more from hill to hill. Then the channel straightened out and we lost 2/3 of the habitat. We only have a third of the feeding area we used to have.

Water Quality

Linda Franklin had firm memories about the change in the temperature of Honeydew Creek. It is currently much warmer than it was when she was a child. She recalled that the temperature of Honeydew Creek was so much colder than the temperature of the Mattole, at the confluence, that you could easily move from the cold to the warm water for swimming. She said that she loved swimming in the Mattole, rather than Honeydew Creek for that reason. At present, when she goes wading in the lower mainstem, she said that she can scarcely detect a difference between its temperature and that of the Mattole.

Franklin placed the beginning of the temperature change as early as about 1981, when her parents went from sheep ranching to raising trout in ponds. She said that they monitered the temperature in the creek near their home and she recalled their amazement that water temperatures would reach 80 degrees in the creek in July, a level they knew from their trout raising experience was fatal to trout. Franklin attributes the rise in temperature to both the straightening of the creek (presumably the loss of holes around rocks) and the loss of riparian cover upstream. She said that although alders are thick in places now, they are thick over the riffles, not over the ponds, so that they are basically ineffective as shade to cool the water.

Fish

Anonymous oldtimer (90 years) remembers hundreds of adult salmon in Honeydew Creek when he was a child.

Anonymous oldtimer (50 years) frequented swimming holes on the mountainsides, rather than in the lower mainstem. She went up the West Fork and upper mainstem on long walks as a child. "Oh, there were wonderful fish. There were rainbow trout that would be this long (indicated 1 1/2 feet). Some of them. They were huge rainbow trout in there and down to little bitty ones, of

course. And there was quite a bit of a steelhead run that came up. Not much in the way of salmon up there. In the lower part there was some salmon."
The last time she saw a big rainbow trout in the upper reaches of the mainstem or West Fork was when she was 12 (38 years ago).

Linda Franklin recalled that, 40 to 45 years ago, at her family's campground above the lower East Fork and at the end of the spur of Smith-Etter that has now been removed, she saw salmon on their in-migration. Counting their backs in the water, she saw 2 or 3 a day passing by. Her father and uncles would return from fishing upstream with salmon. She has a photo of a tall uncle holding a salmon that reaches from his shoulder nearly to the ground, caught near that campground. She herself caught a silver salmon near the mouth of Bear Trap Creek (in the Mattole?) 10-12 years ago and remembers her father remarking that it was the first one he had seen since the 1955 flood.

During trout season, in her childhood, she fished upstream from the campground for a half-mile for steelhead. She said they were abundant. She remembers no other species, except for "bullheads" and "stickerback" in Bear Trap Creek.

Wildlife

C. J. Hindley: There used to be a lot more deer. We weren't blessed with bears and panthers back then. It was sheep country and we trapped the varmints. Nixon stopped it. Fish and game release bears there. You used to see eagles so bad, they'd raise hell with the lambs, peck them right off the hillside.

Anonymous oldtimer (50 years): White tail deer is what we (used to shoot). There were bear up there. Dad did bring a bear out a time or two. Quail and grouse, there was that kind of stuff. It was very much our food source, during some periods of my life. We'd have venison more than we had beef.

Anonymous oldtimer (90 years): Were there more deer back then? gosh, yes.

Linda Franklin states that in her childhood there were fewer and smaller bears, no coyotes, more eagles, more deer. She said that she used to accompany her father in walking a 5 mile trapline that he set for predators. It went "down the old road by Honeydew and across, past the bear waller and up the ridge another quarter-mile." The line was set mostly for bobcats, but her father, she said, also trapped bears. In walking the trapline, she would see 40-50 deer, most individually rather than in herds.

Fires

Several informants remember fires being set or setting them themselves, along with groups organized to do that. Ranchers varied in the degree to which they prepared for and supervised the fires they set. Linda Franklin's father, she reports, divided his land into 3 sections and burned a different section each year. In the 2 years between burnings, the brush in a given section would reach 10 feet in height. Franklin maintains that no fires ever escaped from her father, who used a bulldozer to put a fire road around the area to be burned. She remembers hearing stories of other ranchers whose fires did "get loose."

Anonymous oldtimer (50 years): They burned every 3 years to keep the underbrush out, so that the larger animals had freer passage and would not be eaten by the cats. In the Fall of the year, they did a 'quick burn,' they call them, when everything is dry. They burn through so that it doesn't take out the timber, but it takes out the underbrush. The timber gets scorched, but it lives. I can remember setting the fires myself. Most everyone out there did it. I guess white folks picked it up from Native Americans, that it was a good idea to do it. It gave you a chance to get your native grass back for your cattle or sheep or whatever you were raising and get rid of the brush.

C.J. Hindley described burning after logging: We'd log a section and then burn and reseed it, and have good pastures, like the Indians.

Tim Roscoe, 35, remembered that there were still set fires when he was 10: Everybody went from one end of the valley to another to control the brush, they did it as a group. Like CDF, only less formal, and more experienced and informed. CDF now doesn't realize the value of fire as a resource tool. Honeydew watershed was on the periphery (of the burning activity) because there was so little cattle raised there. They did control burns in the lower part, but the other end, they just left the lightning fires to burn and let the set burns go up the watershed until they burned out.

Anonymous oldtimer (90 years): The ranchers used to have burns every year. It kept the bugs out of the acorns and burned off the underbrush. Forestry stopped it. It never harmed the old growth and went no further than the ranches. Those ranchers knew when to burn and when not to. They watched the humidity and knew what the fires were going to do. The Indians taught them.

Thomas Grundman: There were lots of set fires. The ranchers in that watershed that set fires were Etters, Smiths, Shinns and Landergens. They used to light them to keep the poison oak down, at least every 2 years. Now the brush is so high that if you started one, you couldn't stop it. The oldtimers would burn off a little at a time. At the mouth of Hondeydew you can see poison oak, on Smith-Etter road, where there used to be grazing ground and the brush was kept back. It's been 10 years, at least, since the last burn. I wish you could do it again.

Naturally occurring fires were mostly started by lightning and, according to one informant, those were allowed to burn until the rain put them out as part of the brush clearing philosophy. "There's been a lot of fires, because lightning is high out there. There were always lightening fires, periodically. But no one seemed to get excited about them. If they're not near anyone's home, they'd wait for the rain to put it out, which it does. Where there's lightening, there's gonna be rain, you know."

Linda Franklin had a different recollection, that efforts were always made to fight lightning strike fires, where possible. The first informant, mentioned 2 other small lightning fires that she could specifically remember, one ca. 1952-54 at the base of King's Peak and one at "Johnson's" on Bear Trap Ridge when she was 14.

There were scattered mentions by informants referring to 3 big fires in or near the watershed. The most recent is discussed under "present conditions." Of the first of the other two,

anonymous oldtimer (50 years) told this story. "I can remember my Dad saying that years and years ago...You know, I used to worry about the dead snags, we'd sit on the porch and look up that hill all the time, (towards King's Peak from Bear Trap Ridge) and I'd think about those snags. And I said, 'Well, what killed that tree?' and Dad said, 'It was a big fire, but it was a long time ago,' and he never told me when." It would have been in his childhood, however, she said, "somewhere around the turn of the century."

1949 Mattole to Shelter Cove fire

Anonymous oldtimer (90 years) recalled a fire "30 years ago...a fire so intense...It burned a lot of animals. The whole mountainside and Wilder Ridge. Me and my friends fought it all night long, to keep it from jumping the county road. It scorched all the big trees and lots of big •trees burned. A few steep canyons had timber left, but on the ridges it got everything. The trees never came back. It doesn't look at all like it did before. Only Brush came back. It was on King's Peak and spread over into Bear Creek."

C.J. Hindley told of a big fire "during World War II" and said it was the only big fire he could remember, burning the whole King Range. He laughingly said that it was set by the "natives." Linda Franklin believed that he must have been referring to a fire in 1949 that started "between the grange and Roscoe's" near Squaw Creek and burned from there to Shelter Cove, missing the Honeydew watershed entirely. She said that she always had heard that it was a set fire that "got loose."

If the 90 year old informant, (whose accuracy in estimating time intervals might reasonably be considered open to question on the general basis of advanced age,) was remembering a fire that was 46 years ago, rather than 30, he might have been recalling this 1949 fire. It would be possible to be in Bear Creek preventing a fire from jumping Wilder Ridge Road south of the Honeydew watershed.

Floods

Since all of the recollections of informants relating to floods date from the 1955 flood, they are included under "Current Conditions" below.

CURRENT CONDITION

Private Ownership and Residence

Among the current social factors that affect ecological processes in the watershed are the rising population in that segment of the watershed which is not owned by the BLM, the attitude of private land owners towards land management in general and the way in which owners manage and use the land in their possession. In the Honeydew watershed, private land is almost exclusively located in a strip on the western slope of Wilder Ridge at the eastern rim of the watershed.

A rough idea of the population density and land use patterns in this area emerged from a statistical analysis of county tax records (see Methodology). The statistical sample consisted

of the area within the watershed that appears on the USGS Honeydew 7.5 minute map, an area of approximately 4360 acres or 57 square miles. In addition to the western slope of Wilder Ridge, the sample area includes the flood plain area on both sides of the Honeydew Creek outlet. All of the discussion below applies only to the area sampled.

Approximately 3,018 acres, or 69 percent is privately owned by a total of 37 owners. Ten of these own a total of more than 100 acres within the sample area. The largest total holding is 506 acres, the second 328 and the third 188. The total holding of 6 of these 10 owners include 1309 acres, or 43% of the total private land in the sample area, in single parcels of over 100 acres. Of the remaining 57%, or 1709 acres, by far the majority of the parcels are small, less than 45 acres and owned by someone for whom that parcel is the only land they own in the watershed. There are 21 of these, 1 of whom retains a small parcel that was formerly a ranch owned by her family for at least 4 generations. The remaining 7 landowners have total holdings of between 46 and 99 acres.

The population density of the sample area, including BLM owned land, is 5.6 persons per square mile. Private land in the northern portion is almost exclusively owned by members of families that have been ranching in the Mattole Valley for more than 2 generations. There are a few residences in this area, but far fewer per acre than in the area most recently occupied, the western slope of Wilder Ridge. Although no large commercial enterprises are carried out on these parcels now, they were once part of minimal cattle and sheep ranches. The Wilder Ridge area, with the densest population, consists almost entirely of smaller parcels occupied by their owners and managed for non-commercial uses.

Although the names of longtime ranching families appear among these owners, there is substantial reason to believe that many of the small owners are part of the wave of a cultural movement that began in the late 1960's, commonly called the "back-to-the-land" movement. This wave hit southern Humboldt County beginning in about 1968 and has continued into the present time, spreading out from the Whitethorn, Alderpoint and Piercy areas as cheap, logged-over land became less available.

There are 28 owners in the sample area who are possible candidates for this classification (see Methodology), controlling a total of approximately 1373 acres or 31% of the sample area. That there is a perceived difference in the attitude of members of families with a long history in the watershed and those who have arrived during the 1970's is verified by comments made to the researcher from both sides. How the difference could actually be operationalized is a matter for more extended research than was done here. However, the following discussion of the "back-to-the-land" movement in southern Humboldt County assumes that its adherents in the Honeydew Creek watershed differ in no significant way from those in southern Humboldt County in general (cf. Anders, 1990).

The major value that motivated the back-to-the-land movement was the desire to relearn how to live on land in a way that would meet minimal human needs without causing permanent damage to the natural environment. In other words, to explore the degree to which it might be possible to restore human culture to the ecological niche it occupied for the millions of years before human populations began to have an irreversible impact on their natural surroundings. The expressed goal of the "new settlers" is to meet as many needs as possible through wise management of land while reducing family needs to what can be produced from the land without permanently damaging it.

In many ways, these goals, also called "voluntary simplicity," closely resemble those of the original American pioneers, including those who settled in the Mattole Valley. The early new settlers, in fact, often sought out and were given direct guidance in their endeavour by local residents who sympathized with their economic goals, if not other aspects of their movement. This was a characteristic trend in southern Humboldt County.

No information has emerged documenting such relationships within the Honeydew Creek watershed, except that several residents who qualify as new settlers by the standard criteria made references to conversations with "oldtimers" about aspects of their mutual residence in the Mattole Valley and in some cases, events within the Honeydew watershed. These references and the manner in which they were made suggested that the speakers validated the similarity between their attitude toward rural living and those of the people to whom they referred. What is often shared by new settlers and oldtimers is a respect for the natural processes of the environment. This was and is implied in the culture of the pioneer families, but is expressed specifically by new settlers.

Speaking in terms of expressed values only (as opposed to their implementation), a subscriber to the back-to-the-land philosophy could be expected to be less open than a non-back-to-the-lander, for instance, to commercial uses of his or her property, such as large scale logging or housing developments. Many such owners, who are overwhelmingly owner-builders, have selectively logged their own land to obtain materials for building their homes. They are more willing than most to forego the use of public utilities in favor of environmental values and more likely to actively engage in restoration activities on their own land and elsewhere. They value the concept of home food production and usually grow some portion of their own food. If a cash crop is grown, its potential negative impact on the landscape is considered and a high value is placed on growing it without the use of potentially harmful substances or practices.

Hunting and fishing are generally regarded as activities to be pursued for subsistence, rather than sport, and as resource availability allows. However, this value is frequently undermined by a general distrust of experts, particularly those provided by governmental agencies, so that a direct perception of resource availability will overide one seen to be imposed from the outside by experts managing a resource on a larger scale. This is another area of value overlap between new settlers and oldtimers.

There is no way, within the restraints of the current research effort, to calculate the extent to which the expressed values of new settlers are actually implemented. While the difference cannot be quantified, qualitative statements may be made based on observations. It may be assumed, on the basis of the number of restoration projects and environmental organizations in Southern Humboldt County that have been founded, financed and maintained principally by members of this subculture in the last 20 years, that back-to-the-land proponents are more familiar with ecological concepts and value them more than the average American, rural or urban. It may be further assumed, on the basis of fundamental research in social science, that most people do not normally behave in a manner that conflicts entirely with their expressed values. To some as yet unknown extent, therefore, the way in which the land owned by these later-arriving Honeydew Creek residents can be expected to be used in the future will differ from the way it would have been used by other kinds of urban emigrants or by the descendants of historical families who no longer engage in the home-production and subsistence farming economic strategies of their ancestors. A discussion of them is included here simply as an

indication that assumptions about behavior which might be applied to the newly arrived population of a similar rural area elsewhere may not strictly apply here.

Aside from the implications of the cultural difference, there are potential impacts on the watershed that accrue to the population change itself. Logically speaking these are both positive and negative. It is clear that the increase in population density on Wilder Ridge in the last 20 years brought with it the construction of numerous access roads and driveways that have the potential to dump sediment into the creeks and to erode hillsides in inverse proportion to the effort expended in road maintenance. Whether these roads are greater or lesser villains in that respect than the roads made in the course of the brief logging boom is arguable, but access roads continue to be cut, while logging roads have grown over and are no longer in use.

Informants were unanimous in the opinion that the maintenance of private roads has improved steadily in the last 10 years or so, as the result of the educational efforts of the Mattole Restoration Council. Many residents are encouraged by this, but point out that the problem is by no means solved and that erosion caused by poor private road maintenance still has a major impact of fish restoration efforts.

Another impact of increased population density on Wilder Ridge has to do with fires. Logically speaking, the more people there are in any given area, the greater is the probability of a fire originating from human activities, residential and recreational. This greater probability would be counterbalanced to some degree by the fact that the more people there are, the greater is the likelihood that the fire will be spotted early and put out. At this point the firefighting skill and motivation of the people in question comes into play. Also logically speaking, the more experience one has had with wildfires the more conscious that person will be of their potential for destruction, when they are likely to occur, how to spot them and what to do then.

There is no reason to believe that the Honeydew watershed is any different than the rest of southern Humboldt County in this fire-related social dynamic. What has happened in the last 25 years in southern Humboldt in general is that the increase in human related fires has been, over that period of time, counterbalanced to some degree by the growing firefighting skills of the rural residents. Volunteer fire departments have been organized and have educated residents who are often eager to learn the skills which might save their uninsured homesteads.

Honeydew does have a volunteer fire department and residents interviewed proved to be highly motivated and interested in fire prevention. However, it must be cautioned that those interviewed were not a random sample of residents in the watershed. It is reasonable to assume that the persons who would consent to donating 20 or 30 minutes of their time on behalf of responsible land management would be statistically more likely to also feel a responsibility to educate themselves on fire prevention and fighting than the numerous people who declined to be interviewed or did not return mailed questionnaires. Whether the increased probability of human caused fires that accompanies increased population density is effectively counterbalanced by the increase in people to observe and put out fires thus cannot be determined within the scope of this analysis. The problem can only be mentioned as one that is relevant to land management issues in the watershed.

A second fire-related factor that accompanies increased population density, however, is clearly indicated. This relates to the possibility of managing fires to return to the pattern characteristic of Native American and early rancher occupation of the watershed. This pattern, according to numerous informants, was discontinued as a function of policies of CDF sometime

in the last 15 years. The presence of numerous residents on Wilder Ridge with much to lose, should a fire set by the BLM get out of control is necessarily a factor in deciding the degree to which and the areas in which reinstituting the former pattern can be attempted.

Responses to no other question asked during the research broke so clearly broke along the subcultural line between new settlers and oldtimers. Oldtimers uniformly lamented the loss of the annual set fires and the build up of brush that has resulted. New settlers uniformly expressed opposition to anything but the most gradual and careful reinstituting of set burns. While they recognized that the more brush there is on BLM land, the greater the likelihood of an uncontrollable wildfire, they pointed out that there has been too long a period during which the brush has built up to risk eliminating it with fire at this point.

Geology/Erosion

Social perceptions of the condition of the watershed in terms of erosion and the attribution of causes vary. Both natural processes and human processes have contributed to the many large and small slides that are found in the watershed. Natural causes include the high rainfall, steep slopes and frequent seismic activity. Human causes include roadbuilding for logging and access to residences and recreational areas as by far the major human cause of erosion and, to a much lesser extent, the removal of trees and overgrazing of sheep and cattle.

As extensive, scientific and detailed discussions of the geomorphology of the Honeydew watershed based on scientific surveys have been published (Mattole Restoration Council, 1989 and Dunklin, 1995), and geology is not the researcher's field of expertise, this discussion will focus only on what emerged from the social survey and interviews.

Although references were made to numerous naturally caused slides and other eroded areas in the watershed, informants were unanimous in regarding the watershed as the least damaged watershed on the Mattole. According to C.J. Hindley, "Honeydew Creek didn't suffer damage like the Upper North Fork (of Mattole) did. It never developed gravel bars from logging. There was logging towards Smith-Etter Road, just a little, and the 1964 floods caused a little wear and tear, but not much."

Natural Causes

Many references were made to the Heartshaped slide. Thomas Dunklin, the engineer who is supervising the removal of a portion of King Range road, reported a conversation with Ed Hasty, State Director of BLM, who was the engineer who approved the building of the King Range Road in 1963. Hasty reported that the completion of the road was stopped by the presence of the Heartshaped Slide. Dan Trower, who conducted fish surveys 10 years ago in the watershed said that at that time the main channel was eating through the rubble at its foot. Jan Morrison, who also conducted fish surveys in the area commented that it does not bleed in the summer.

Lower East Fork. Trower said that 10 years ago, uprooted trees, not sawed ones, were piled up and blocking the progress of fish upstream. He mentioned "a couple" of slides on the King Range side of the Lower East Fork that he noticed 8 years ago.

"Recovery Slide"-Dunklin, who studied aerial photos, says that the Recovery Slide started in 1955. It shows up in 1960 photos as being of moderate size. In 1966, it reached its current proportions, having grown larger mostly in 1964, when other parts of it came down. Frank

Landergen said of it that it was not 2 separate slides, but a big one that turned into 2.

In April of 1992, Jan Morrison drove by the lower creek after the daytime earthquake and noticed that the water, which had been blue that morning was completely brown. She reports that immediately after the earthquake, she saw a cloud of dust over the slide.

High Prairie Creek. This drainage was designated by several people as a major source of erosion problems. One informant, however, used it as an example of an area that was logged and never caused any erosion problems, beyond what could be expected naturally, after that. Dan Trower: We did a lot of planting up there and just 2 winters ago it was almost 145 inches of rain and a lot of debris came down and plugged the culvert—that was 92-93. Last year it did the same thing. It was worse last year. Last year we got almost 174 inches and that whole culvert was plugged up with water going over the road. So High Prairie was still pushing a lot of debris down in the heavy rain years. I went up there, to the point where the gradient got too high. Near the bottom it looked like it has sustained damage in the past, but was recovering. That's one of the reasons why the heavy rains that we had after the drought probably caused so much damage. Jan Morrison: The whole tributary is a mess. Some inappropriate restoration work was done there. It changes rapidly. If you hike up the creekbed, there is a whole steep slope falling into it.

Lower mainstem Honeydew.
Suzette Woodburn: A massive slide developed on our property on New Years of 1993. The creek had for years prior to that had an eroded bank. The previous owner had dumped rock on it, but it got too wet and fell. It's 60-70 feet across, has been looked at by the Mattole Restoration Council. It's still there. It's in the 'back 40', past Johnson's house, near Showen's and extends quite a ways into BLM land.
Jan Morrison commented that there were lots of slides on the lower mainstem below the bridge.

Cowpie Creek.
Jan Morrison said that, on Annie Smith's property, she has hiked up the creek and seen a slide coming from an old road. She said that BLM tried to pull it out, but that it "didn't work," and that the whole road is contributing to siltation of the creek.
Bear Wallow Creek. David Simpson reports that there is stream bank erosion on all but the West Fork of this creek.

Roads
Dunklin calls the West Fork, mainstem and Upper East fork "transitional refugia" in his publications, based on non-damaging management. They are not as eroded as the Lower East Fork, High Prairie and Bear Trap drainages, he said, because they have been in public, rather than private ownership. In direct contrast to this opinion is that expressed by Thomas Grundman, who claims that "wherever you see messed up land, that land is in public ownership. Where you see nice land, it's private."
Dunklin mentions many roads blown out from logging in 1963 in the upper basin of Honeydew Creek. When the King Range road is removed, according to him, it will take away a major

source of erosion. He added that King Range Road is a low use road, that he "never" sees any cars on it.

Logging or BLM roads:
Jan Morrison: There are lots of old logging roads still visible on the east side of the lower mainstem between the mouth of High Prairie Creek and the confluence of Honeydew with the Mattole.

High Prairie Creek
Anonymous oldtimer: There is a network of logging roads up the High Prairie drainage, below the first big, point-shaped bend in the creek, and going from there to the confluence. They are no longer used.
Thomas Grundman: Road damage is not too bad in the watershed. Even in 100 inch months we've had no slides on the new roads. However, the new bridge on Smith-Etter road was not necessary and everything there is going to erode. I've never seen where logging adds much more silt, not with all the rain. You look at High Prairie Creek. It was logged in 1963, but it now looks the same as it did in the 1940's. "
Anonymous oldtimer: On Bear Wallow Ridge there are logging roads on the south side of Honeydew Creek and on both sides of the ridge at the end nearest the mainstem. It was logged in the late 40's and early 50's. These roads are now completely overgrown and almost invisible.
Anonymous oldtimer: The fire break road off Smith-Etter has only one bad spot at the bottom that washes out every winter. Otherwise it does not need much maintenance and should have been left open.
"If they're going to open it up and go in there every so often, why not just leave it there so you don't have to go back and disturb everything all over again?"

According to Tim Roscoe, the dead-end road near the airport does not erode badly because it is solid rock.

Lower East Fork

According to Thomas Dunklin, this drainage has the most extensive network of abandoned roads, except for the High Prairie Creek drainage. The two drainages are about the same in terms of abandoned logging roads and problems caused by them. In studying the drainage, Dunklin found roads with 4-5 foot deep in-bound ditches sending water into gullies. Directly across from Recovery Slide is an example of such a road.

Private roads

In general, private roads on Wilder Ridge vary greatly in the degree to which they are maintained. According to Dan Trower, who quantified his remarks very reluctantly, about one third are properly maintained. "Two thirds could use a little monitoring. There are spots that are geologically unsuitable for roads, even if you put one in right, it would be hard to maintain it to the point where it would not contribute to the degradation of the water courses."

One informed offered the information that Bob Stansberry keeps his road in good condition. Another mentioned Landregen's access roads as being in fairly bad shape because they are semi-

abandoned and not maintained.

Fish

Information from informants is unequivocal in reporting that the current populations of salmon and steelhead do not faintly resemble the numbers reported by oldtimers for either the Mattole or for Honeydew Creek. The last salmon seen by any of the informants in Honeydew Creek was 3 years ago in the lower mainstem. Two informants who were classified as "2's" in terms of their relationship to the watershed (see Methodology) made these reports. One said he saw 2 adult king salmon at the mouth of Honeydew Creek. The other, resident Gary Haga, said he saw a female salmon of unspecified species, about 40 pounds in size, below his property on the mainstem near High Prairie Creek.

Two other 2's saw chinook, coho and king adults 7 years ago while surveying. Two additional 2's saw adult salmon carcasses within the last 10 years. One of these saw them both on the lower reaches of the mainstem and into the lower West Fork.

Reports vary on the current status of the steelhead population in Honeydew Creek. Woodburn commented "it is strange that I have seen no more than 15 to 20 adults total in the whole time I have been working there (Honeydew Creek, 12 years)." He reported that he has seen hundreds of juveniles in holes on the mainstem, including the hole near the BLM campground. Woodburn noticed no change in the steelhead population in the last 12 years.

Haga has noticed a change in the number of fish in general in the hole near the BLM campground. He said that he had seen "thousands of fish there, but not in the last few years." Haga, who says that he has been fishing in the general area since childhood, said that in a typical year of fishing near his residence on the Honeydew mainstem, of 50 fish caught, 3 will be brown trout (he is sure of the species), the majority will be rainbow trout and a good portion will be cutthroat. He mentioned that 1995 has been a record steelhead season on the Mattole.

A total of 6 informants, all 2's, 3 of whom were working as fish surveyors, reported seeing what they assumed were steelhead juveniles in Honeydew creek in the last 7 years. One of these, Maureen Roche, said that she was certain that she had seen summer adults and as far upstream as the Lower East Fork. One of these informants saw steelhead adults in both the Lower East Fork and the West Fork. This observation is supported by one of the 6 informants who saw redds on the West Fork, a half-mile upstream from the confluence. Dan Trower, working 12 years ago, saw hundreds of juveniles in holes as far as the Recovery Slide on the Lower East Fork.

Trower was one of the original surveyors for the Mattole Restoration Council. "We were trying to pinpoint where the salmon were spawning. Conditions of the redds and what they call carcass counts. After the spawning was over I would go down...sometimes it was easy. You could smell them, you try to get there before the coons and predators dragged them up out of the water. That was over 10 years ago, I would imagine. It was when the restoration council first started and we were trying to put things together, to figure out what was best for the fish."

"Honeydew Creek was my area because I live here. We went back up to the...probably the 2 or 3 miles of the lower east fork. We went up about 3 miles on the main channel, went to the bottom of the Heartshaped Slide to see what the condition of that part of the channel was...and we went up beyond it a little way and a little bit up the West Fork. Not on Bear Trap, because we didn't go where the gradients were too steep for the fish. We stayed where they were

flat and could navigate."

"We were looking for salmon, kings and silver, and steelhead. I went up a creek as far as I was finding carcasses and then I would go up a little farther and if I didn't find anything, my assumption was that they didn't go up any further. We found fish carcasses, some of them were so deteriorated that I couldn't identify them. If you get there early enough you can identify them by the gums, if they are not too rotten and you try to get the full length, if you have the head and the tail, you can measure from the tip of the nose to the fork of the tail and get an estimate of how big the adult was, but a lot of times all you find is the head or the tail. Occasionally an intact body."

"We found redds and carcasses, evidence of spawning activity, on all the main tributaries of Honeydew creek, up to the point where the gradient was too steep, where we thought the fish couldn't navigate. Probably most of the main channel up to the base of the Heartshaped Slide...! got to the base of the West Fork, until it started to go up too steep and a few miles on the Lower East Fork, 2 miles from the confluence with the main channel. I didn't go up the Upper East Fork."

"I found carcasses at each of those points. I can't break them down as to species. I just know they were salmonids and most of the intact carcasses that I found, where I could identify what species they were, were in the main channel. It took me longer to get to the tribs and by the time I got there, they were too far gone to identify or the critters had gotten to them. They were large fish, but I couldn't tell if they were steelhead or salmon."

Trower and Haga mentioned the presence of sticklebacks in the lower mainstem and Haga's mention of brown trout is corroborated by an anonymous oldtimer who said that she was sure she had seen brown trout in holes "halfway up the West Fork," which she last visited 2 years ago. This informant, in discussing her recent observations, said she had seen rainbow trout 6-8 inches long in the same hole on the same visit, but nothing else. Also 2 years ago, she said she saw fish on the upper mainstem, a half-mile to a mile above the West Fork confluence, 6 inches long, but she could not identify the species.

Morrison never saw any fish in any of the tributaries when she has hiked in the last 5 to 7 years, even when specifically looking for them. In 1993, Suzette Woodburn and friends went into a tributary upstream from the popular swimming hole in the lower mainstem, whether it was High Prairie or Bear Trap is unclear. They caught "hundreds" of fry too small to identify as to species that were caught in "puddles" and transported them to the mainstem and released them. She has never seen that many "tiny" ones since.

Wildlife

Asking informants to name species that they had seen in the watershed generated a list of 36 names (Appendix A), not all of which may reflect species level distinctions. Squirrels, for instance, include gray and ground and eagles could be bald or golden. This exercise does not represent anything remotely scientific or statistical but does indicate that Honeydew watershed does house some wildlife at present, even though one informant who visits other watersheds' frequently said that she has the impression that there is less wildlife in general in the Honeydew watershed than in similar areas elsewhere in the Mattole Valley.

Informants are agreed that the current condition of wildlife in the watershed represents a change from the distant past and has changed drastically very recently. Deer have decreased

markedly in areas on BLM land, according to hunters and hikers, and have increased markedly on private lands, according to residents. This change is widely attributed to the increase in predators on public land, including human poachers and mountain lions. Several added that the buildup of underbrush makes it difficult for the deer, but not for the "cats." (This informant included bobcats.) One person who said he hunts frequently said that just in the last 6 years, the alders and willows had increased so much on Honeydew Creek that the only place left where he could get through them was on Bear Trap Ridge.

Bears and mountain lions are widely seen as being greatly increased in general in the watershed and 2 informants suggested that bears from other areas were being released in the King Range. One resident had so many bears on his land that he could not estimate how many sightings he had had in 13 years, but after thinking about it offered the information that he was sure there were at least 6 different individual bears. He said that one was so tame it would walk past his several barking dogs to get to the apple tree. This informant, Sean Woodburn, said that he had seen all of these bears between his land on the mainstem to the big slide on the Lower East Fork a mile and a half upstream.

Another resident, speaking of the increase in mountain lions and bears said that one bear had put him out of the bee business and some other predator had put him out of the chicken business.

An oldtimer said that her family had raised sheep on Bear Trap Ridge until they were unable to keep them alive anymore because of the predators. "The wildcats and the bobcats and the mountain lions had gotten too prevalent. We stopped having sheep there about 7,8,9 years ago." This informant said that she recently saw a mountain lion "stroll" through her yard and that she had never seen that before, though she's lived there all her life (50 years).

Woodburn, who has been employed in the past as a naturalist, said that he had seen more mountain lions in the past 3 years than in the rest of his 13 year residence put together. Rather than attributing it to increased numbers alone, however, he suggested that there were more sightings because they were becoming tamer. Trower's observation that deer gathered around his oaks and he was sure the mountain lions were hunting those deer supports the idea that it is not increasing numbers alone, since if the deer are hanging around the private residences because that's where there is less underbrush, the lions may simply have followed them there.

There were *2* reports of single event bald eagle sightings, but Haga reports a nest not far from his house and says that he watches them fishing on the Mattole frequently. He is living a half-mile from the fish ladder at High Prairie Creek and says they live in a snag in front of that ladder and fish in the Mattole. Dan Trower reported seeing a definite adult and possibly some juveniles 10 years ago when he was doing fish surveys 2 miles up the lower mainstem Honeydew. Sean Woodburn had one sighting in the same area, lower mainstem, 1 1/2 miles below the Lower East Fork confluence.

Floods

That flooding in the watershed has not been among the most important of events is indicated by the fact that one of two questions most frequently answered no was have you ever seen any flooding in the watershed? (The other referred to use of resources other than timber and fish.) Six respondents answered no to that question and another 3 answered no verbally, then strained to qualify it. Four respondents mentioned flooding at the mouth of High Prairie Creek, during

the winter of 1992-93 and again in 1994-95. It was caused by a culvert plugged with debris. One informant claims that the debris came from the failure of a fish ladder placed there earlier.

Dan and Claire Trower mentioned flooding on the "long levee going toward Honeydew, downstream from the campground. Claire said it floods every year near the Shinn residence, many times, but never stays flooded for more than a few hours at a time. Dan says it floods only when there is more than 100 inches of rain. Tim Roscoe mentioned flooding every year at the bridge crossing below Smiths. Alison Grundman mentioned a spot 100 yards up Honeydew Creek from confluence. She said that was 4 feet deep in the winter of 94-95 but could be forded easily at that time the year before.

Oldtimers disagreed on the effect of the floods of 1955 and 1964 on the Honeydew Creek watershed. One said that the 1955 flood "sat for a week but left no damage." Of the 1964 flood, she said "The water came up, then it went down. No problem." Another said that there was not much "wear and tear" from the 1964 flood. Jan Morrison said that by her observations, "Honeydew Creek clears up from excessive water faster than any other Mattole creek."

Strongly in opposition to this view is that of Linda Smith Franklin, who specifically attributes the decline in the salmon and steelhead populations in Honeydew and elsewhere on the Mattole to the 1955 flood, which "straightened out the channel." Before that, according to Franklin, the lower Honeydew meandered much more than it currently does, across the flood plain from hill to hill. She said that, whereas previous floods had damaged the channel, her father would use a bulldozer to "put the creek back into the original channel." After the 1955 flood, he was prevented from doing this by the difficulty of obtaining a permit to do so, or some other "red tape" (researcher's words) problem. Therefore, two-thirds of the habitat in the lower mainstem, by her estimate, was permanently lost.

Fires

Informants are agreed that the history of fire in the watershed included fires set by residents in the past and the cessation of this *practice has resulted in greater* fire *danger* due to the buildup of fuel, as well as having an impact on wildlife. They are agreed that there is currently much more undergrowth in the BLM controlled areas that there ought to be. In the area of private residence undergrowth is controlled to some undetermined degree, probably not nearly as much as set burns did in the past, by the manual cutting of brush around residences and the cultivation of grassy areas around buildings. There is great disagreement as to what should be by BLM in the future regarding set burns.

The only large fire in the watershed in recent history (last 20 years) was a fire in July 1990 that was one of a number of fires set by lightening on Cooske Ridge, King Range and elsewhere. All informants except Claire and Dan Trower and Alien Heady reported that this fire appeared to them to be a number of scattered fires high up on the ridge near King's Peak. The Trowers and Heady had a very different picture of the fire. The difference in perception is easily explained by noting that the Trower's observed the fire from their residence which is the closest residence to the fire and situated to get a full view of it. Heady observed the fire, along with the Trowers, from the deck of the Trower house.

According to C. Trower, there was smoke in the area of the fire for a week "before anything happened." Other informants say it smoked for 2 weeks in total. The other informants cite the very heavy smoke as the reason why they could not see exactly where the fire was or

what it was burning. Dan Trower, Chief Emeritus of the Honeydew VFD, gave a detailed account of the fire, although he said that he was on Cooskie Ridge fighting the fires there. His account is assumed to be a compilation of intermittant observation, later analysis and the reports of C. Trower and other direct observers.

Dan Trower: It was coming down this side of the King Range well into the Honeydew watershed. (Pointing towards King Range from his deck). It was moving kind of northeast, one big fire coming over the ridge. See the top of that round mountain over there on the right side where it's dark and the left side, where it's light? (time=11am) Well, that whole knoll was burning. It's just north of the King Range (meaning King's Peak?) See the trees on the ridgetop where they're thin? They were all burning. Right around the top of the Heartshaped slide, it was coming down on both sides of that. And the little knoll to the left of the big one was burning. Maybe 40 or 50 acres on the east side (of King Range). What you saw burning on this side was from when the wind came up off the ocean, it was pushing it over to this side of the ridge. It came right over the ridgetop and kinda flowed northeast.

Claire Trower said that although big trees were burning, the fire never crowned. Jan Morrison remarked that it "seemed to drip down the hillside, as if from rolling, burning bark." Gary Haga remarked that it was rain that finally put it out, not the CDF. One informant was concerned that the number of trucks and firefighters and equipment she observed being taken to the area may have caused more damage than the fire itself.

Frank Landergen, referring to an earlier large fire in the watershed, remarked that the King Range area in the watershed looks nothing at all like it did before the fire he was speaking off. He claims that large areas where there once were big trees, before that fire, which may have been the 1949 fire, are now devoid of trees, except for isolated steep gullies that escaped the fire.

Water Quality

The only reference to temperature came from Linda Franklin, as described above under "Past Conditions." Most informants answered no when asked if they had had any reason to be concerned about the water quality in Honeydew Creek. Those who did respond were most concerned about the actual or potential presence of giardia in the creek water. Two references were made to cattle grazing to near the creek at the Shinn ranch. One resident had water tested that originated on the top of Bear Trap Ridge and giardia was found by the county health department. A reference was made to a resident who had had it in his water and gotten rid of it. In both of these references, it is unclear whether the parasite was found in water from a Honeydew tributary, or whether it was in water that had originated in springs, run over the surface at some point, but not yet reached a larger tributary.

Three informants mentioned siltation as a water quality problem (rather than an erosion problem). Two commented that they had seen muddier water in Honeydew Creek than in the Mattole after earthquakes. One, who has worked extensively with the MRC, expressed concern that the lower mainstem water was not "well-oxygenated."

A frequently mentioned potential water quality problem emerged from the survey, but not necessarily from the question on water quality specifically. This was the possible presence of an illegal methamphetimine plant somewhere on the lower reach of the mainstem Honeydew. No one was able (or willing) to provide any direct information on this plant and everyone said that

they had heard of it from someone else. Two informants offered the information that, years ago (5-10) there had been a large number of dead fish found in the Mattole River near the mouth of Honeydew Creek. Both suggested that this might be the source of the rumor.

Resources used

Among the species that are gathered on BLM land, other than through hunting, fishing, grazing or logging, informants named the following: huckleberries (many reports), pennyroyal, alder seed, foxglove seed, wild asparagus, oyster mushrooms, chantralle mushrooms, bears' breath, and blackberries (exotic Himalaya). Twelve informants specified that they knew of no one who gathered anything from the BLM land and that they did not.

WATERSHED PROCESSES

Fires

Based on both the literature and information gathered from informants there is good reason to believe that deliberately set fires were a major factor in the Honeydew Creek watershed both historically and prehistorically. It has been well established that northern California aboriginal people in general regularly burned brush. Roscoe's (1985, pp. 16, 33-35) discussion includes many references to the role of burning in the Mattole Valley in general. Roscoe (p. 15) also quotes a sea voyager in 1786 who reports seeing a large fire on Cape Mendocino as his ship went by. The traveler attributes it to volcanoes, Roscoe suggests that it was a fire set by the inhabitants. Baumhoff (1958) also states that the Sinkyone burned off the "chapaurral." Clark (1983, p. 85) refers to the Mattole Indians' burning practices.

That there was aboriginal burning in Honeydew watershed in particular is reported by 2 of the descendants of Mrs. A.A. Hadley, one of whom bases her assertion that set bums have been in the watershed "forever" on her recollections of conversations with her grandmother about the Native American occupation of Honeydew watershed. Several oldtimers, one in his 90's, remarked that the white settlers had learned the practice from the local Native Americans. They specifically included Honeydew watershed in these general statements about the Mattole Valley when asked.

Large fires, natural or set, appear from the statements of informants to have had little effect, since the only large fires any of them remembers, including the most recent one in 1990, passed by Honeydew watershed. The 1990 fire appears to have had the most effect of any large fire since the one that allegedly occurred around the turn of the century.

A very frequently occurring remark from informants, particularly the members of old ranching families, was that the underbrush had built up to an intolerable level since the set burns had been discontinued 10 to 15 years ago (accounts vary on when they stopped, perhaps reflecting efforts to conceal illegal burns that might have occurred after permits stopped being issued.) Simultaneously more recent residents along Wilder Ridge Road have expressed concern at the possibility of BLM reinstituting the practice of control burning, since the built up brush might now create a fire that could seriously endanger their homes.

Population growth

Ironically, in spite of the drastic cultural changes that have occurred in Honeydew

watershed, the population density estimated by this researcher for a sample area within the watershed (5.6 per square mile) is exactly the aboriginal population density estimated by Baumhoff (1963, p.223) for a large area of California that includes Southern Humboldt (5-7 per square mile). This should not in any way be taken as an indication that the Honeydew watershed has not been increasingly affected by the presence of humans within it however, for several reasons.

Principal among these is the extreme cultural difference between the modern population and the aboriginal one, including the fact that use of the watershed is not, in the modern case, limited to its occupants. The 5.6 persons per square mile now occupying the watershed are spread out on homesteads with access roads and engaging in a panorama of activities like livestock raising, bulldozing, and water removal that may be assumed to have an enormously larger impact on the land than the activities of any aboriginal inhabitants. These, if any, would surely have been living in groups on flat areas near water courses and disciplined and organized by kinship connections to use the land according to traditions based on a thousand or more years of occupation and observation of resources.

Such activities as sheep and cattle grazing and large scale mechanized logging would not have occurred as a result of the presence of the aboriginal population.

The generality of Baumhoff's map comparing aboriginal population density vs. the specificity of the Honeydew watershed, is something to be considered also, keeping in mind that Honeydew watershed, because of its apparent geographically transitional status between groups may have had a lower number of occupants than other watersheds on the Mattole or in Southern Humboldt. Baumhoff uses the aboriginal population estimates of S.F. Cook (1963, p. 160) to develop his ecological correlations. For the Mattole, this estimate is 1200 in a 219 sq. mile area and for the Lolangkok Sinkyone, it is 2,076 for a 254 sq. mile area (1963, p. 184), yielding a population per square mile of about 2 and 8, respectively, indicating some variation between tribes, but not enough to have had much effect on differential impact on the land. The comparable aboriginal and modern population density figures are also deceiving in that the modern one includes the presence of BLM land which is not continuously occupied. Given the general population increase in Southern Humboldt County in the last 25 years, it is likely that it is only the presence of BLM in the watershed that prevents the modern figure from being much higher.

Logging

References to logging by informants indicates that it has not been a major factor in the shaping the watershed. As one informant put it, "they were in and out." Roadbuilding in order to log included the enlargement of Smith-Etter Road from a sheep rancher's trail to a road with wide enough curves to accommodate logging trucks (Linda Franklin). Logging roads, according to informants, were built in specific places in the watershed including High Prairie Creek watershed, the south side of Bear Wallow Ridge,

According to one informant, it was "just a little bit (of logging). The just used an old cat, the way they used to do it. There was logging roads that grew over rather rapidly, when they stopped using them. Each time they moved the logging base, the other ones would grow over, quite rapidly, really."

All of the residents on Wilder Ridge interviewed (a half dozen) said that their land had

been logged in the 40's and 50's, but reported no obvious damage to it as a result. Whatever influence logging in the areas not managed by BLM has had in the past, the results of the survey suggest that it will not be a factor in the future. No informant predicted future logging on their own land, but 3 reported that their own ongoing restoration efforts would continue.

Grazing

Little information was obtained on grazing. Sheep were grazed at Bear Trap ridge. According to informants, sheep ranching began in the 1920's and 30's. "My father was a great believer that the grass would not come back if you overgrazed. So he kept his at a small herd. He had about 300 head at one time, was the maximum that we ever had at any one time." (A second informant reports 400 as a maximum for that ranch.) The Shinn ranch reportedly had 400 to 500 sheep and "Dad was always angry about the fact that...he thought that he had too many for the amount of free land that he had. I can remember that being discussed, but I don't really know how many he (Shinn) had. Overgrazing was a problem in some areas of the valley, (unclear if Mattole or Honeydew, but informant kept insisting that she was only talking about Honeydew), but I think most of the ranchers were pretty good about that, so that the native grass wouldn't be killed out. They didn't want to have to feed them (the sheep), which seems reasonable to me."

When predators began to become a problem, "it wasn't long before there weren't many sheep in the valley anymore. Some people went to cattle, because they were more easily protected and less easy for the predators." The Smith ranch did not go into cattle-grazing, but raised trout instead.

There are references by informants to cattle now being grazed in the watershed at the Shinn ranch. The references were made in connection with water quality rather than overgrazing.

Marijuana Cultivation

No doubt because cultivating marijuana is illegal, only 2 references to this practice turned up in the survey. These references, however, in combination with the prevalence of hemp cultivation as an economic strategy in the Southern Humboldt area in general (cf. Anders, 1990) indicate that it may well be an ongoing factor in the ecology of Honeydew watershed. One reference was to "potting soil" contaminating creeks and the other was to massive erosion on a private parcel caused by numerous trails on steep terrain.

Habitat Restoration

Several residents reported having been involved with the Mattole Restoration Council's efforts on Honeydew Creek. These are outlined in Elements of Recovery. Both the fact that Honeydew watershed residents who are experienced in fish habitat restoration and the fact that the Restoration Council is active in restoration on an ongoing basis should be included in any listing of ecological processes in the watershed.

CONCERNS

A question on concerns that should be addressed by BLM was included on the questionnaire, as an enticement to participation ("now's your chance to dump on the BLM") as

well as to alert the BLM to any special problems occurring in the watershed. More information was spontaneously offered in this category than any other, much of it conflicting directly across the cultural line between "oldtimers" and "back-to-the-landers." It is here summarized with no attempt to reconcile the differences.

Smith-Etter Road. The Smiths should be allowed to maintain it. Speed limit and no trespassing signs should be posted near residences. Access should be allowed to the beach.

Roads in general. All of them should remain open. As few as possible should remain open. No more should be built. More should be built. Removing King Range road is very good. Mapping the roads is high priority, as Elements of Recovery did not do that.

Logging. No logging (2). Responsible logging is ok.

Hunting. More hunting should be allowed, predators are on the increase (3). The combination of hunting and drinking during fire season is bad.

Too many poachers. They are Southeast Asian emigrants (2). They are oldtimers who have been seen gigging spawners in the creeks.

Grazing. Should be allowed, but supervised. Should not be allowed. Don't plant trees, should be more grassland.

Control bums. Bring them back, too much brush. (3) Don't bring them back, employ people to cut manually instead.

Recreational use of BLM. More trails ok. Limited public use ok. (2) Too many people are using it. People are wandering into private areas from new campground.

Riparian vegetation should not have been removed from near BLM campground.

BLM public relations. Big problem (2). BLM has been instrumental in healing the watershed by managing for natural values. BLM's Bear Creek Watershed Analysis was disappointing. BLM does not make enough effort to communicate and involve the MRC. BLM uses biased geological consultants. BLM doesn't keep its former agreements. BLM should check with the Sinkyone InterTribal Council for traditional land management pointers.

HISTORICAL RESOURCES

When the data-gathering phase of the social research was terminated, a number of potential sources of historical information had not been explored. These include informants suggested by those interviewed and not yet been contacted and photographs, videotapes and audiotapes in the possession of informants that might be of use. These are listed in Appendix B.

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APPENDIX A

EXHAUSTIVE LIST OF WILDLIFE EVER SEEN BY INFORMANTS IN HONEYDEW CREEK WATERSHED

Numbers refer to number of informants who mentioned the species, no matter how many times they had been seen. The ringtail cats were only seen once by each informant.

raccoon (4)
ringtail cat (3)
bobcat (4)
porcupine (2)
opossum (3)
bald eagle (3)
owl (3)
redtail hawk (4)
frogs (3)
toads (3)
Pacific salamander (3)
bear (8)
deer (10)
mountain lion (5)
fox (3)
woodpecker (1)
river otter (2)
crane (1)
blue heron (2)
coyote (3)
squirrel (4)
quail (2)
eagle (bald or golden) (3)
vulture (2)
skunk (2)
turkey (2)
cottontail (2)
jack rabbit (4)
woodrat (2)
mice (2)
osprey (1) (a nest is reported on BLM land, off Smith-Etter road, 1/2 mile from____)
western tanager (1)
newt (1)
mole (1)
gopher (1)

APPENDIX B

Resource persons collected but not contacted:

David and Lucille Corrington 986-7610
Steve Smith 629-3502
Roland Landergen (has fishing photos from 30's) 707-528-4937
(Scott Rourke is a relative, 707-544-2857) Ken Wallen 923-2597 (road builder) Larry Smith 923-3925 Buzz Lindley (fish) 629-3415 Bobby Shinn 629-3310 Lynn Chambers 629-3555 Mike Dulas 629-3663 (gathers herbs?) Douglas Fir (re-evaluation of forestation projects of MRC) 986-7338

Linda Franklin has photos showing forest fire damage and salmon fishing.

Honeydew Volunteer Fire Department (Dan Trower) may have a videotape of a training session that includes spawning salmon or steelhead at the mouth of Honeydew Creek.

Marlene Greenway can provide the location of an audiotape of an interview Linda Franklin collected from Ken Roscoe.

The Mattole Restoration Council has a videotape of erosion in the Mattole Valley that includes Honeydew watershed. They loan out copies.

Appendix B

RESULTS OF THE 1994-95 NON-VASCULAR PLANT SURVEY FOR THE HONEYDEW, BEAR CREEK AND SOUTH FORK BEAR CREEK WATERSHEDS

February 1996

INTRODUCTION

This survey was initiated as an attempt to begin meeting one of the implementation requirements needed to complete watershed analyses as mandated by the Northwest Forest Plan.

The Survey and Manage (S & M) portion of Standards and Guidelines required most component surveys to be started in FY 1994 with implementation starting no later than FY 1996. No protocol for non-vascular plant survey is yet in place, although the Regional Ecosystem Office (REO) is due to have a draft for review later this month. However, because Annual Work Plan restoration projects were planned for the key watersheds mentioned above, Arcata Resource Area developed an interim protocol with the cooperative assistance and expertise of CSU Humboldt's mycologist Dr. David L. Largent.

SCOPE OF SURVEY

Objectives

The primary objective of the inventory is to discover what non-vascular plant resources exist in these key watersheds. Second, resource specialists will determine how many species are listed under Table C-3 in the ROD and then discern what measures need to be undertaken from there.

The objectives outlined in cooperative agreement B950-A4-0034 are as follows:

To provide a census of the bryophytes, lichen, and fungi of the Honeydew, Bear Creek, and South Fork Bear Creek watersheds located in the King Range National Conservation Area including:

1) a list of fungi indicative of the Honeydew, Bear Creek, and South Fork Bear Creek watershed as a whole
2) a list of bryophytes and lichens present
3) census will include species listed in Record of Decision
4) census will provide qualitative abundance
5) census will correlate map locations and/or microhabitats in such a way that the data can be entered into a GIS database.
6) census will indicate which species are uncommon or rare
7) census of fungi will include:

a. categorization of fungi as mycorrhizal, parasitic, or saprophytic b. a list of edible species present 8) census will occur in fall and spring

Methods

A. Study Sites

The majority of the King Range National Conservation Area (KRNCA) consists of a mixture of tanoak (Lithocarous densiflora) and madrone (Arbutus menziesii) with scattered patches of Douglas fir (Pseudotsuga menziesii): the range varies in elevation from 1400-4088 feet. Scattered areas within this community have an evergreen huckleberry (Vaccinium ovatum) understory. A few riparian areas have very small stands of red alder (Alnus rubra) which were not large enough to sample effectively. In addition to these habitats, there are a few areas with canyon live oak (Quercus chysolepis) on some south facing slopes and scattered patches of California Bay (Umbellularia californica): both of these habitats were not sampled.

The major difference at any given point within this plant community, referred to as Mixed-Evergreen Forest, is the age and relative composition of each of 3 species (Douglas fir/tanoak/madrone). In addition to this community, there are areas of open grass which are widely scattered; sampling of mosses, lichens and fungi were not conducted in this habitat since the species composition of these organisms present there are neither, abundant nor diverse.

Since most of the study area is occupied by mixed-evergreen forest, the choice of plot sites was based on factors such as stand age and relative composition of conifers/hardwoods/understory. A relatively small number of plots (11), each of which covered a relatively small area, were established to allow for complete sampling during each sampling period/season. The study plots were located near a road to eliminate travel time between plots. To view location of plots, see **Attachments A & B.**

B. Protocol

1. Initially, the entire study area was surveyed for plant community composition.

2. Permanent plots were established in the different age classes of varying composition of the Mixed Evergreen community type. The size of plots varied depending upon terrain; natural boundaries were selected rather than unnatural boundaries.

3. Sampling procedure: perambulation throughout the entire plot was used rather than straight line transects. Plots were sampled frequently, often once a week or at least every two weeks, from fall 1994 through summer 1995.

RESULTS

ROD Listed Species

Plots 1,3,5,6,10, and 11 were found to contain ROD listed species. All of the lichens were nitrogen-fixing and were found in old growth or late-mature stands of tanoak. All of the fungi were restricted to plot 10, which contained old-growth Douglas fir and plot 11, which contained young to moderate-aged Douglas fir.

Table 1 ROD listed non-vascular plant species found in the survey plot for a given habitat and aspect.

PLOT #	HABITAT	ASPECT	ROD-USTED SPECIES	S&M STRATEGY
1	Late mature Douglas fir/tanoak/madrone; some alder, bay, dogwood, (creek site)	East	*Lobaria pulmonaria* (lichen) *Pseudocyphellaria anomo/a* (lichen) *Pseudocyphellaria anthrapsis* (lichen)	4 4 4
2	Late mature Douglas fir/tanoak/madrone; sugar pine, blue huckleberry, salal. (creek site)	North	none	
3	Old growth Douglas fir/tanoak/madrone, big leaf maple, *Ceanothus sp.,* alder, (creek site)	Northeast	*Lobaria hallii*** (lichen) *Lobaria pulmonaria* (lichen)	4 4
4	Old growth/early mature Douglas fir/tanoak/madrone. (creek site)	Northeast	none	
5	Early to mid-mature tanoak/madrone; early mature, even-aged Douglas fir. (ridgetop)	Northeast	*Pseudocyphellaria anthrapsis* (lichen)	4
6	Old growth Douglas fir/tanoak, blue huckleberry	Northeast	*Peltigera collina* (lichen)	4
7	Early mature, even aged Douglas fir stand: typical of large regions throughout the study area.	North Northeast	none	
8	Mid to late mature Douglas fir/tanoak, big leaf maple.	East northeast	none	
9	Old growth Douglas fir/tanoak, bay, redwood, hazelnut. (riparian)	Northeast	none	
10	Old growth tanoak/madrone, Douglas fir, manzanita sp., blue huckleberry, (forested ridgetop)	East-west	*Cantharellus cibarius* (fungi) *Ramaria rubnevanscens* (fungi) *Lobaria pulmonaria* (lichen)	1.3 1,3 4
11	Young Douglas fir. No understory, (forested ridgetop)	North-South	*Cantharellus cibarius* (fungi) *Choriomyces venosus* (fungi)	1.3 1.3

***Lobaria hallii* was the only rare species of nitrogen-fixing lichen found in Rot 3 and it was observed near the center of Plot 3 growing at the base of an old-growth, moss covered oak. However, two visits to Plot 3 were devoted to locating the exact niche occupied by this species; each visit failed to verify its occurrence in the plot. Either through misidentification of the original collector, Mark Steiger, or the removal of the specimen, the existence of this species in the plot should be considered questionable.

Habitat Information

A. Strategy 4 Species-Conduct Regional Surveys

Four species of nitrogen-fixing Lichens, *Lobaria pulmonaria, Peltigera collina, Pseudocyphellaria anthrapsis,* and *Pseudocyphellaria anomola,* are all listed as Strategy 4 species in Table C-3 of the ROD.

Table 2 Qualitative abundance and niche in which strategy 4 lichen species were found.

Species	Qualitative abundance	Location In plot	Niche
Pseudocyphellaria anthrapsis	scattered	throughout plot wherever tanoaks are found	on branches of old growth to late mature, moss covered, tanoaks
Pseudocyphellaria anomola	scattered	throughout plot wherever tanoaks are found	on branches of old growth to late mature, moss covered, tanoaks
Peltigera collina	scattered	throughout plot wherever tanoaks are found	on branches of old growth to late mature, moss covered, tanoaks
Lobaria pulmonaria	abundant	throughout plot wherever tanoaks are found	at base of old growth to late mature, moss covered, tanoaks

B. Strategy 1,3 Species-Manage Known Sites/Conduct Extensive surveys

Three species of fungi and one specie of lichen was found in this survey. *Lobaria hallii* was found in Plot 3 and as noted above, its verity is questionable and thus niche information impossible to collect. Three species of fungi, *Cantharellus cibarius, Ramaria rubrievanescens,* and *Choriomyces venosus* were observed in the study area and are indicated in the ROD list as requiring strategy 1 and 3.

Ramaria rubrievanescens and *Choriomyces venosus*

A single, over-mature specimen of *Ramaria rubrievanescens,* a rare, epigeous coral fungus, was collected during the first week of December in the drip zone of an old growth Douglas fir located near the road marker in plot 10. *Choriomyces venosus,* a rare, hypogeous (fruiting underground) truffle, was collected near the south boundary of Plot 11 in the drip zone of an old growth Douglas fir.

Both specimens were partially decomposed and thus microscopic verification was impossible. Because of the condition of each specimen, microhabitat data was not

obtained. Specimens of both species were not observed during the weekly visits to each of the plots either before or after the collection.

Cantharellus cibarius

The yellow chanterelle, one of the species whose basidiomes(fruiting bodies) are harvested by commercial mushroom pickers, was found during early October in Plots 10 and 11 in very scattered patches of only 1-4 basidiomes each. In these stands it was associated with young to medium-aged Douglas fir, particularly in areas in which Vaccinium was present. The chanterelle occurred in that part of the forest which has a moderate-closed to closed canopy and in which moss covered humus was absent and buried wood present.

Table 3 Qualitative abundance and niche in which strategy 1,3 species were found

Species	Qualitative abundance	Location In plot	Niche
Ramaria rubrievanescens	one specimen collected	near road marker of Plot 10	drip zone of old growth Douglas fir
Choriomyces venosus	one specimen collected	on southern border of Plot 11	drip zone of old growth Douglas fir
Cantharellus cibarius	in very scattered parches of 1-4 basidiomes	throughout plots 10 and 11 wherever the niche occurs	young to medium aged Douglas fir, Vaccinium +; closed canopy; moss humus absent; buried wood usually present

Non-ROD non-vascular plants

294 species of non-vascular plants and 511 observations of these species were recorded from the 11 study plots (see **Appendix,** List I for location of species per plot; List II for summary of species per plot, and List III for relative abundance, mycorrhizae, and edibility of fungi). Mushrooms (94) species, Polypores and related fungi (21), Lichens (34), and Mosses (45) were the most abundant with the majority of fungal species found in plots 9, 10, and 11. The majority of lichens and mosses found in plots 2 and 3.

30 edible fungal species were also found in the plots. One of the thirty species, *Cantharellus cibarius,* (ROD listed) is a popular commercially picked mushroom and therefore a potential source of revenue through harvesting permits. A second ROD-listed species, *Ramaria rubrievanescens,* is an edible coral fungus. In addition, the ROD-listed hypogeous fungus, *Choriomyces venosus,* is a potentially important food source for rodents.

A typical representation of pathogens and wood rotting decomposers were identified from all the plots with *Phellinus pini,* which causes heartrot of older conifers.

Two species of fungi, never before collected in northern California prior to this study, were found in the study plots. One basidiome of *Polyporus tuberaster* was collected in late December in Plot 5 on buried wood in the drip zone of a tanoak located just off the road. Several basidiomes of *Typhula quisquillaris* were collected in Plot 10 on dead fern petioles during mid-October.

Discussion

Survey and Manage Strategies and Their Economic Implications

First it must be noted that this survey is not complete. Because fungi are very sensitive to weather conditions and because the year this was survey was done was such a poor year, it can not be said to be representative for fungi. However, it is reported to be representative for lichens and mosses. This survey cost $13,868.38. The primary investigators report it would take 5 years of surveying to have a complete fungal inventory. There could be more S & M nonvascular plants in these watersheds.

Table 4 ROD Species and S & M Strategy Requirements

	ROD SPECIES	STRATEGY DEFINITION	MUST START BY	MUST COMPLETE BY	$$$ NEEDED
STRATEGY 4	*Lobaria pulmonaria Peltigera collina Pseudocyphellaria anomola Pseudocyphellaria anthrapsis*	Conduct General Regional Surveys	FY 1996	FY2006	unknown*
STRATEGY 1	*Choriomyces venosus Cantharellus cibarious Ramaria rubrievanescens*	Manage Known Sites	immediately	immediately	unknown*
STRATEGY 3	*Choriomyces venosus Cantharellus cibarious Ramaria rubrievanescens*	Conduct Extensive Surveys	FY 1996	N/A	unknown*

• $$$ needed depends upon REO protocol and requirement to meet objectives of surveys.

A. Strategy 4

The objective of Strategy 4 is to survey for the species to acquire information and to determine necessary levels of protection. These surveys are expected to be both extensive and expensive, but the information from them is critical to successful implementation of ecosystem management. Specific surveys prior to ground disturbing activities are not a requirement.

B. Strategy 1

Strategy 1 is the highest priority. The objective is to compile known sites in a GIS database. Use this information in the design or modification of projects. In most cases, the appropriate action will be protection of relatively small sites, on the order of 10 acres. However, for rare and endemic fungi, the ROD states that areas of 160 acres should be temporarily withdrawn from ground disturbing activities around known sites until they can be thoroughly surveyed and site-specific measures prescribed. *Choriomyces venosus.*\s a rare truffle and would rank for this management restriction. At present there is no official direction from the REO on what is a "thorough survey" or what measures are to be prescribed once the area is surveyed.

C. Strategy 3

The objective of Strategy 3 is to conduct extensive surveys for the species to find high-priority sites for species management. Specific surveys prior to ground disturbing activities are not a requirement. Do broad surveys for those species during times of appropriate conditions. Again, at present it is unknown what exactly constitutes and extensive survey or what to do once such a survey is completed. Guidance from the REO is pending.

D. Strategy 2

The objective of strategy 2 is no ground disturbing activities prior to surveys. At present, no strategy 2 species have been located in the King Range National Conservation *Area.*

CONCLUSIONS

Survey Integrity According to Dr. Largent, Fall, 1994, Spring, 1995 and summer, 1995 were very poor seasons for production of fleshy basidiomes of fungi: the rain did not occur until mid-November and was followed soon thereafter by freezing weather. As a consequence, the list of mushrooms, boletes, coral fungi, tooth fungi, hypogeous fungi, puffballs, and discomycetes is very depauperate and this list **should not** be considered representative of the study area. As an example, two commercially important species, *Tricholoma magnivelare* (Matsutake) and *Boletus edulis* should have been recorded in the King Range habitats. Both of these mushrooms are very sensitive to weather conditions and will not form sporocarps during unfavorable environmental conditions. In addition, the yellow chanterelle, *Cantharellus cibarius,* should have been quite abundant and should have been observed throughout most of the study area.

However, most species of lichens and bryophytes are semi-permanent members of

the crytogamic flora and thus are much more reliable as they are always present, usually in a dehydrated state. As a consequence, the list of lichens and bryophytes are probably representative of the study area. It should be noted that ephemeral species of bryophytes were not collected as these are effected by environmental conditions in a manner similar to the fleshy sporocarps of fungi.

Because of the general homogeneity of the vascular plant communities in the King Range, the species list of lichens and bryophytes is probably a good representation of the larger communities in which these plots are located. A more extensive survey would surely add more species from the ROD, particularly for the fleshy fungi, and possibly for the lichens, but since most of the ROD bryophytes are indigenous to the Olympic Peninsula and the Cascade Range, it is unlikely that many, if any, of them will be found in the King Range Area.

How to Meet the Requirements set forth in the ROD for S&M Species

The information acquired at this time only offers us a partial inventory of what exists in the study area. This survey does not supply enough data that any correlations with habitat or aspect to species found can be made. Further, guidance as to how to meet the requirements in the ROD, and what to do once the various intensity levels of surveys are met, are not available at present. Guidance from the REO is pending. Therefore, no management conclusions can be drawn.

However, there are seven ROD species in the study area. One of which, *Choriomyces venosus,* is rare and must be protected from ground disturbing activities with a buffer of 160 acres until further surveys and subsequent specific management prescriptions are applied. How to distribute the buffer area is unknown at this time.

It is possible that a cooperative agreement could be created that would essentially contract out case by case inventories when ground moving projects are proposed. The flaw with this is that it does not take in the big picture, the ecosystem, for which this entire forest plan was based. More regional surveys are needed.

Appendix C

HONEYDEW AND BEAR CREEK RESTORATION PLAN

Contract # N651-RFP5-3053

Produced by:

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April 16, 1996

RESULTS

HONEYDEW WATERSHED

Landslide and Erosion History

According to air-photo interpretation, small scale timber harvest activities in the Honeydew watershed began around 1948. Larger scale harvesting was occurring by 1954 with operations in Bear Trap Creek drainage, along Wilder Ridge Road, within the lower two miles of Honeydew Creek, and in a small portion of the upper reach of the East Fork Honeydew Creek. The 1966 air-photos reveal harvest activities through-cut the northern and eastern portions of the watershed. The area north of the confluence of Honeydew Creek and the East Fork Honeydew Creek had been burned after harvesting and converted to grassland. By 1973, harvesting was past its peak activity with very few new areas entered. The BLM acquired the land in the mid 1970's and harvest activities ceased soon thereafter. Timber management activities have continued to occur on private land within the watershed.

Prior to 1955, landslide activity was fairly minor with the exception of one large scale slide in the upper portion of mainstem Honeydew Creek. The major storms responsible for the 1955 and 1964 floods had a devastating effect in the Honeydew drainage. Both floods generated a huge number of slides, mainly within the inner gorges of streams. Although many new slides occurred in the unentered portions of the watershed, landslide density was greater in the managed landscape. This appeared to be due to the extensive road and skid trail system failing within the inner gorges and the flood waters destabilizing the toes of slopes and activating slides.

Analysis of the 1973, 1984, and 1992 air-photos reveal the landscape within the watershed beginning to, and continuing to, recover with many landslide scars becoming revegetated. The stream channels also appeared to be recovering from past impacts. Bank wasting was greatly reduced from previous levels and the riparian vegetation had reestablished itself, sometimes with the help of local volunteers, thereby helping to stabilize the channel. However, the two natural large-scale active landslides located in the headwaters of Honeydew Creek, each with surface area greater than 1,000,000 $ft^{2,}$ continue to contribute sediment to the channels which results in channel widening and aggradation.

Honeydew Watershed Road Conditions

The BLM's road history map of Honeydew watershed contained an estimated 45.8 miles of roads within the agency landholdings. Drivable roads made up 13.2 miles with 32.6 miles of abandoned haul and skid roads. Due to the difficulty of obtaining access through private land, 2 miles of land-locked skid roads were not inventoried. All the drivable roads and 22.2 miles of abandoned haul and skid roads on BLM land were inventoried. Approximately 8.4 miles of abandoned haul and skid roads were road fragments that would require major road rebuilding to access. For some of these, the entire road prisms had failed. Approximately 6.4 miles of road have had tree planting, stream crossing excavation, and/or outslope work. Roughly 30 miles of private roads exist in Honeydew watershed outside BLM landholdings.

Active Road System

All the active road systems within the Honeydew watershed exhibit a need for additional drainage structures and improved maintenance to reduce fine sediment transport from the surface, IBD, and fill slopes. Below are descriptions of drainage problems and summaries of the work needed to make these road systems as erosion proof as economically possible. (See Appendix A for road and culvert locations, Appendix B for rehabilitation site details).

Smith-Etter Road is in fairly good condition with only a small amount of rilling and IBD scouring. One or two waterbars or relief drains with dissipators would be beneficial near the old jeep road. This is an erosive area that gullies easily from concentrated water run-off. Relief drains are needed where seeps concentrate water and cause IBD downcutting at four different locations. Minor headcutting occurs at SE-1RD on the outboard edge of the road.

Bear Trap West Road (the north-running ridge on the west side of Bear Trap Creek) currently exhibits extensive gullying and rilling for almost its entire 2 mile length within BLM lands. The IBD is incising in some areas and failing in others. There are no cross drains anywhere along this road. This road requires upgrade reconstruction and is presently in worse hydrologic condition than the majority of abandoned roads. Waterbars, rolling dips, and/or cross drains must be constructed to prevent water from runoff and seeps concentrating on the road surface.

North Slide Road (the southwest portion of Smith-Etter Road system) is in good condition. It is 100% outsloped with no observable rilling or gulling. There are a few areas where rocks have dislodged from the cutbank and landed on the road. No work is necessary on this road, apart from removing the rocks.

King Range Road in the Honeydew watershed is stable and in good condition. Just north of the largest stream crossing (KRHD-7), an IBD and relief drain is needed to keep the concentrated water from rilling the road. Breaching the outboard berm in several places is also recommended to keep water from concentrating down the road. A restoration project is currently underway on the King Range Road south to the Lightning Trail (Bear Wallow Ridge). This area will be restored to natural grade by the end of 1996.

Inactive Road Network

The majority of the inactive road network in Honeydew watershed within Federal jurisdiction lies primarily in Bear Trap Creek and the upper East Fork Honeydew Creek drainage. The vast majority of the stream crossings and, in some cases, entire road prisms have failed in the last 30 years. The remaining fills are for the most part stable. As a result of landslides, stream crossing and road prism failures, heavy equipment access is limited unless new roads are constructed. Moreover, new road construction would likely disturb more soil than the small amount of remaining fill to be excavated. Almost all of the landings observed were stable with 20 to 30 year old trees growing on the fills.

BEAR TRAP CREEK AREA

Past harvesting operations accessed timber in this area by constructing haul roads and skid trails from the ridges down into, and up from, the bed *of* Bear Trap Creek. These roads were constructed with almost no drainage structures. As a result, the majority of the road prisms, skid trails, and stream crossings in Bear Trap Creek have washed out with the floods in the 1960's and 1970's. The remnant inner gorge haul road in Bear Trap Creek has revegetated with alders, conifers, and other vegetation. Diverted channels created by upslope tributaries onto the old inner gorge road are stable, having already delivered their sediments. The vast majority of the skid road network has also stabilized and revegetated. Heavy equipment rehabilitation of the inner gorge road system would result in a level of disturbance that would outweigh any potential beneficial effects.

On Bear Trap West 1 (BTW1) Road, a large landing was constructed where the road crossed a class II watercourse. The northern approach to this landing also filled in a class III tributary to the class II. Approximately 50% of the class II crossing fill has eroded into the watercourse and washed downstream. Perched fill remains within the crossing and along the road. The road beyond this crossing has diverted several class III drainages resulting in small and large gullies. Another landing with perched fill and poor drainage is located at the end of the road where it crosses the Class I waters of Bear Trap Creek. A plan that will pull the perched fills, slope back the crossings, and add rolling dips at the class III drainages and swales is recommended for this road.

The Top End of Bear Trap Creek, or TEST 1 and 2, are a couple of skid road systems with minimal perched fill remaining near the stream crossings. The other skid roads leading into Bear Trap Creek are stable with substantial vegetation on the road prism. All the stream crossings were found to be washed out. Past rehabilitation work completed in the Bear Trap Creek drainage include Douglas-fir planting on an eastern access road to Bear Trap Creek, as well as on adjacent slopes.

LOWER HONEYDEW CREEK AREA (FROM SMITH-ETTER ROAD)

Those roads that spur off the Smith-Etter Road into the Honeydew Creek drainage hold little restoration potential. The initial diversion from concentrated water on Smith-Etter Road that washed out the start of the Old Jeep Trail prism has been corrected. Stable diversions and small amounts of perched sediment exist, but they are difficult to access (the ridge road adjacent to the old jeep trail road would be the access route). The Jeep Ridge Road has a slump and small diversion from springs not far from the Smith-Etter Road access. Considering the poor accessibility to this location and limited vegetation on the road, it is considered a low priority for rehabilitation, which should be conducted only if equipment is in the area. The other skid roads inventoried off the Jeep Ridge Road and the Smith-Etter Honeydew Creek side (SEED) are in steep, erosive topography. They contain washed out stream crossings and various remnants of intertwining skid trails that have no significant sediment sources remaining. The lower mile or so of the Bear Wallow firebreak road (BT-B and BT-C) has stable stream excavation work and outsloping.

UPPER HONEYDEW CREEK AREA (FROM KING RANGE ROAD)

The inventory of the road system branching off Bear Hallow Ridge firebreak road, accessed from King Range Road, revealed only stable fragments of the past road network. The stream crossings, as well as several large sections of road, east and west of Bear Wallow Ridge, have washed out. Large slides have isolated road segments within BWR-A, OBWW, EFW-U and EFW-L, making heavy equipment access impossible without extensive new road construction. Two stream crossings on the EFW-O Road system containing less than 150 cubic yards of sediment combined, were rated low priority considering the inaccessibility and established vegetation. The cutbanks on many of the traversing skid trails in the BWR-A and UBWW areas have naturally eroded to a condition that appears similar to a mechanical road outslope. Overall, the road sections that still exist are stable, well vegetated, contain minimal future erosion potential, and would require major road rebuilding to access due to landslides and wash-outs.

The network of abandoned roads and skid trails that exist near the Honeydew-Bear Creek divide include the Divide Road, Honeydew Ridge Road (HDRR), and a previously rehabbed road. These roads are, for the most part, stable with minimal future erosion potential. A low priority problem exists on the Divide Road in the form of 2 class III diversions causing gullies down 125 feet of road, but with nominal downslope effects. Dipping out the crossings would correct the problem. However, this work would be better accessed and completed by a hand crew than by heavy equipment.

OTHER

Federally owned spur roads accessible only from Wilder Ridge Road through private lands were not surveyed due to lack of access. However, given the condition of the inventoried spur roads, it is likely that some sections of road and many of the crossings have already failed. These roads are probably in the same stage of recovery and stabilization as those that were surveyed during this inventory.

BEAR CREEK WATERSHED

Landslide and Erosion History

Bear Creek is generally not as steep as Honeydew, and landslides have had a lesser role. The air-photo interpretation revealed that erosion and sediment delivery into Bear Creek has largely been the result of inner gorge wasting. This erosion activity appeared to be initiated by the 1955, 1964, and 1970's flood flows eroding the road systems associated with the timber harvesting operations of this period. Mass wasting and sedimentation occurred primarily where the heaviest logging and reading had taken place. High flows also contributed to a high sediment deposition rate in the North and South Forks of Bear Creek where road construction had taken place prior to the introduction of the California Forest Practice Act of 1973 and the Federal Land Management Policy Act.

By 1973, inner gorge and instream roads and skid roads were commonplace logging practices. The highest density of abandoned haul roads and skid trails is located within a 2 mile radius of the confluence of the North and South Fork of Bear Creek. The riparian zones about the creeks were also laid bare from timber harvesting during that time and worsened by flooding. From

Appendix D

WILDLIFE HABITAT RELATIONSHIPS CODES[1]

Standards for Tree Size

WHR	Size Class	Conifer Crown Diameter	Hardwood Crown Diameter	dbh
1	Seedling Tree	n/a	n/a	<1"
2	Sapling Tree	n/a	<15'	1"-6"
3	Pole Tree	<12'	15'-30'	6" - 11"
4	Small Tree	12'-24'	30' - 45	11" - 24"
5	Med/Lrg Tree	>24'	>45'	>24"
6	Multi Layered Tree	Size class 5 trees over a distinct layer of size class 4 or 3 trees, total tree canopy exceeds 60% of closure		

Standards for Canopy Closure

WHR	Closure Class	Ground Cover (Canopy Closure)
S	Sparse Cover	10-24%
P	Open Cover	25-39%
M	Moderate Cover	40-59%
D	Dense Cover	60-100%

Standards for Species Codes

WHR	Species
D	Douglas fir
P	Ponderosa Pine
M	Mixed Conifer Stand (DF,SP, WF, RF, IC)
H	Hardwood - conifer soil TO, Mad, Chinkapin, BO
NT & NC	Non-commercial soil Hardwood, LO, Blue Oak
NF	Non-forest - BS-bare soil, BR-brush, GR-grass, RD-road, RI-river
BS	Bare Soil
BR	Brush
TO	Tan Oak
LO	Live Oak
WO	White Oak
RI	River
GR	Grass
RO	Road
CW	Cottonwood
KP	Knobcone Pine
R	Redwood
MA	Madrone
RO	Rock
BLU	Blue Oak
DP	Digger Pine